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THEISM AND EVOLUTION.

THEISM AND EVOLUTION:

AN EXAMINATION OF

*MODERN SPECULATIVE THEORIES AS RELATED
TO THEISTIC CONCEPTIONS OF
THE UNIVERSE.*

BY

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WITH AN INTRODUCTION BY

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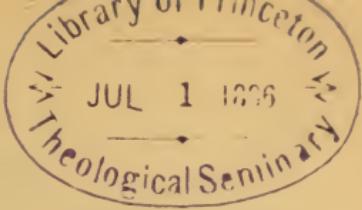
TO MY ESTEEMED FRIEND,

JOHN S. DAVISON,

TO WHOSE ENCOURAGEMENT, ABIDING AFFECTION, AND HELPFUL GENEROSITY THE
FRIENDS OF CHRISTIANITY ARE INDEBTED FOR THIS ATTEMPTED
REFUTATION OF ATHEISTIC FORMS OF EVOLUTION,

IT IS

Affectionately Dedicated.



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P R E F A C E .

THE outcome of modern scientific speculation, as connected with the system of religious faith deducible from God's Word, is likely to prove beneficial to the human family.

Having enjoyed the opportunity of weighing the intellectual products of those who have enriched the nineteenth century, we presume to invite the reader to accompany us in an examination of some of the conclusions reached. Whilst conceding that evolution may give a new impulse to embodied christianity, relieving it of some objectionable features, furnishing attractive arguments in its favor, and teaching the church how to employ new agencies in the elevation of humanity, the writer has undertaken to present an argument against those forms of the evolutional theory which seem to tend towards atheism. We have endeavored to cover the entire field as connected with the origin of man, of matter, of force, of life, of mentality, of conscience. While there is difficulty in believing it possible that man's physical nature is an evolution from the lower animals, and still greater difficulty in imagining that his intellectual faculties may be, it is apparently impossible

to conceive that his moral and religious nature could have been evolved from animals destitute of even their germs.

The origin of man, however, is by no means the only obstacle to the acceptance of atheistic forms of evolution. If all life evolved from a few primordial germs, can we conceive the possibility of results so numerous and so diverse from causes so insignificant? Can an "organless speck of plasson" develop the myriad forms of animal and vegetable life? Is a Superintending Intelligence entirely unnecessary?

Again: ere evolution is entitled to be regarded as a theory capable of furnishing an explanation of the universe, it ought to account for the origin of matter, which bears evidence of having had a genesis external to itself. This done, it should show that there has been no break in continuity, each present growing naturally out of its antecedent past;—and that a series of changes such as evolution predicates may be infinite.

This advanced theory meets also with difficulties when it comes to questions involved in the term Life. Is life mere mechanism? Is it a mode of motion? Is it the aggregated life of an infinite number of infinitesimal bioplasts? Is it molecules of matter braided together in inexplicable ways? Is it one side of that "double-faced unity" matter, whose other side is physical? If there is no Personal God, then life, like matter and force, is an insoluble enigma.

Once more: if evolution is to assume the role of

omnipotence, it should show itself competent to evolve man's faculties,—the intellect, the sensibilities, and the will,—from matter or from physical force; that is, it ought to prove that mind and matter are identical, thought being corpuscular emanations from fibers vibrating under tension, or that mind is a product of matter; or that mind and the ordinary physical forces are identical, or that the former is a product of the latter. It is asked to present incontrovertible evidence that the brain is not the organ of the mind, but is the mind itself, or is the efficient cause of which mind is but an effect. It must then prove that all mental activity is strictly automatic, man being under an inexorable necessity, his motives, his processes of reasoning, his volitions being formed for him, not by him.

There is no conflict between Science and the Bible. They agree in regarding the Divine Will as the originating cause of all things, in conceding that there has been development, in admitting that there have been breaks in the ordinarily continuous flow of events, in believing that the present arrangements of nature must have had a beginning and will have an end, and in attributing the continued existence of the universe to a Power above nature.

We hope the volume shall evince the existence of mentality as an entity distinct from matter, for it is inconceivable that oatmeal and beefsteak were so transmuted by the ordinary physical forces that a relentless necessity elaborated and launched this argument upon

the troubled waters of modern discussion. We prefer to believe that will-force had something to do with its production, and that this will-force was not a product of the granary and the meat-market. The book is a witness, we imagine, to the fact that necessity, generated in gross atoms, has not extinguished individual liberty.

THE AUTHOR.

INTRODUCTION.

SINCE the appearance of Charles Darwin's great work, *The Origin of Species*, the general doctrine of evolution, in one or other of its many forms, has been very generally accepted by scientists as representing the view they have come to take of the operations of nature. This general conception of evolution is as old as human speculation, but it has only now been associated with accurate scientific methods, as a working hypothesis, and its truth supposed to be verified by actual proof. It is typified by the gradual growth under proper conditions of the chicken out of the egg; of the tree out of the seed; of the foetus out of the germ; of the man out of the babe; and the solar systems, with their suns, planets, and satellites in various stages of consolidation and refrigeration, out of the original nebula, "without form and void," to which Scripture as well as Science traces back the birth of the material universe. The things that are, proceed out of the things that were, and in turn give birth to the things that are to be, in unbroken continuity and imperceptible transitions, through the operation of natural laws. This is the very meaning of the old familiar term "Nature," that which is born, and that which gives

birth. The *natura naturans*, the present equilibrium of the universe, producing the in-coming equilibrium of the universe, or the *natura naturata*.

Mere science has nothing to do with origins, or causes, or final ends. It is concerned only with phenomena and their fixed relations in time and space. It is obvious that in this definite view of the range of science, the phenomena of the physical world at least do present in their ceaseless successions the appearance which the evolutionist describes. The solar system is passing before our eyes through constant changes. The sun as it grows cooler is becoming more like Jupiter, Jupiter more like the earth, and the earth more like the moon. The earth and its zones are passing without interruption along a line of graduated change to which the fauna and flora of all continents are continually being adjusted. The various species of plants and animals rise from the simplest to the most complex in an ideal order, and new permanent varieties spring up before our eyes out of the unity of ancient species under new physical conditions. The human race itself has been differentiated into innumerable varieties by means of differences of climate, and social conditions and the like, and all these changes are progressing in unbroken continuity through our own age into the future, just as they have through all past stages of human history.

The scientific doctrine of evolution emphasizes this view of the succession of phenomena, and applies it as a hypothetical law, or working hypothesis, in every depart-

ment of scientific investigation; to the inorganic kingdom, as cosmical evolution; to the kingdom of life alike vegetable and animal; to the origination of species as well as that of varieties and of individuals; to the kingdom of mind, to account for the origin of ideas, and laws of thought; and to the kingdom of social and political life as traced in the origin and progress of human societies.

Now when strictly confined to the legitimate limits of pure science, that is, to the scientific account of phenomena and their laws of co-existence and of succession, this doctrine of evolution is not antagonistic to our faith as either theists or christians. It is only when this theory assumes to be a philosophy, or becomes associated with a philosophy supplying the ideas, the causes, and the final ends which give a rational account of the facts collected, that it can challenge our interest as christians, or threaten our faith. Evolution as connected with a materialistic philosophy will, of course, as are all phrases of materialism, be inconsistent with natural theism and revealed religion. The same is equally true if the theory of evolution is worked out on a basis of pantheism. If evolution is itself erected into a complete philosophy, and be put to the magical task of tracing the growth of all things out of nothing, and of a rational and all-comprehensive system of knowledge out of agnostic premises, then of course the result must be equally fatal to human reason and to christian faith. If again, progress along the entire line of biological advance is explained wholly on the hy-

pothesis of an all-directioned variation, and the selection of special forms by an accidental environment (the precise position of Darwin), then certainly the universe and its order is referred to Chance, teleology is impossible, theism stripped of its most effective evidence, and therefore Dr. Charles Hodge was abundantly justified in indicating this phase of evolution as atheistic. Moreover a theory of evolution which refuses to coalesce for any reason with spiritual views of man and God and their relations, which admits of the possibility of no interruption at any time or for any end; of no influence of any active agents exterior to the limited group of natural agents subject to the test of experiment, and hence of quantitative determination, will of course lead to a denial of the supernatural, and render prayer a delusion and all religion superstitious.

But it is evident that any doctrine of evolution which intelligently recognizes the plain facts of man's spiritual nature, his reason, conscience, and free-will, will equally recognize the same attributes as the property of God. Evolution considered as the plan of an infinitely wise Person and executed under the control of His everywhere present energies can never be irreligious; can never exclude design, providence, grace, or miracles. Hence we repeat that what christians have cause to consider with apprehension is not evolution as a working hypothesis of science dealing with facts, but evolution as a philosophical speculation professing to account for the origin, causes, and ends of all things. Science owes its special

authority to its close adherence to facts capable of verification. But the philosophy of evolution has nothing to distinguish it from the great multitude of transient speculations which for thousands of years have been broken on the eternal facts of man's spiritual nature like the tides of the sea are broken upon the granite rock of the coast. The claim for finality and of superior authority put forth by this philosophy is simply absurd. But the conduct of some weak christian apologists who hasten with super-serviceable zeal to abate the claims of revelation, and to adjust the doctrines of christianity to the demands of the passing mode of thinking of the hour, surpasses all else in absurdity. It is inconsistent with honest faith to fear any possible outcome of genuine scientific progress. True science leads only to the truth, and all truth is congruous with true religion. We should heartily bid science God speed. Since our religion is true, matured science can only confirm and illume it. We have nothing to fear from the ultimate results of the doctrine of evolution as a factor in science. For the same reason it is not becoming the christian faith for its representatives to show haste in bringing forth crude schemes for reconciling our time-tested interpretations of Scripture with the transient interpretations of nature presented by science in its hypothetical stage.

In the meantime, while we wait, it will suffice to indicate certain boundary lines which the scientific doctrine of evolution must not pass; and the passing of which

can alone be rightly regarded as a *casus belli* by the |
christian church.

Every rational doctrine of evolution must recognize its own limitations, and presuppose a creative and rational basis on which it rests. The evolving agencies and the laws of their evolution must necessarily precede and can never be accounted for by the process of the evolution itself.

A true doctrine of evolution can never violate the fundamental laws of human thought. The universal causal judgment affirms that every new thing coming into being must have been preceded by a cause adequate to account rationally for its existence. No possible evolution of molecular mechanics can account for the origin of life, nor for the peculiar properties of living beings, such as organic form, or function, reproduction, heredity, and the like. Much less can such a cause account for the origin of sensation, consciousness, instinct, or intelligence.

Much less can any doctrine really scientific pretend to account for the origination of the higher reason of man, and especially for his conscience and its imperial dictates, by any evolution from preceding non-rational or non-moral existence. The new facts are not composites resulting from the synthesis of pre-existing elements. They are ultimate, incapable of analysis, essentially distinct, and they could have been introduced into the flow of natural evolution only by an immediate act of God, as a new thread is shot by the hand of the

weaver into a rapidly evolving web of cloth. Hence it follows that no true doctrine of evolution can pretend to account on its own principles alone for the origin of man, nor for his fall, nor for the great central epoch-making stages of his redemption. The soul of man stands in such marked contrast with all that precedes it as to be evidently a new creation, and its advent introduces a new era. Hence the facts recorded in the Scriptures as to the creation of Adam and the formation of Eve are not inconsistent with the analogy of truth, and must be recognized as historically true. The character of man sets him forth evidently as subject to a law of entirely different grade than that which has been operating in the previous history of the world. New relations are sustained and a new order of events introduced. Henceforth no doctrine of evolution can be tenable which does not make room for a moral government and a redemptive providence, including miracles and the Incarnation of God, and the gracious operations of the Holy Ghost.

It is not intended in all that has been said to express any opinion as to the truth of evolution in any of its forms, but only to indicate the limits, on the respective sides of which christians, as such, can have no controversy, or no truce.

Dr. Van Dyke has already acquired an enviable reputation as a successful author. He is able, learned, and thoroughly sound in his philosophical and theological principles. The present work is on a subject of universal interest and of vital importance, and is the result of

very wide reading and of mature reflection. It is not intended for men of science, but for that large circle of general readers who are interested in such questions. The object is to allay unwarranted fears on the part of christians, and to warn careless speculators of the limits beyond which it is unsafe to go. The undersigned has accepted the honor of contributing this Introduction, not because he agrees with all the positions assumed by the author, but because he sympathizes with his general purpose, and believes the work adapted to be generally useful. The writer of the Introduction, as far as he differs from the author, would have preferred a more imperative affirmation of the limits beyond which science cannot rationally pass, nor pass without conflict with christianity. This however does not prevent his sincere hope that the book may be greatly blessed in its destined end of confirming true philosophy and revealed religion, and in promoting peace between the men of knowledge and the men of faith.

A. A. HODGE.

CHAPTER I.

EVOLUTION.

WHATEVER hopes or fears we may entertain in reference to the issue of the investigations now so assiduously pursued with the view of confirming the theory of evolution, and to whatever place they may ultimately succeed in assigning man,—whether in nature or above nature,—there can be no question that the conclusions reached and the problems therein involved are well worthy the christian's careful study. The dispassionate discussion of subjects so momentous can only result in good. New facts will be accumulated. Laws hitherto unknown will be discovered, and will secure expression in enduring form. Truth will be eliminated from error.

It is now conceded that new species have been introduced upon the earth since the dawn of creation, especially during the long geological periods which preceded man's existence; and when once we have been induced to believe that creation has had a history we are irresistibly led to inquire after its method. In what way have new specific forms been produced? To this question varying answers have been given.

1. New species have been regarded as immediate creations. This is the view widely adopted by defenders of the Bible. It assumes that each plant and animal was created in a primitive stock, which reproduces its like, thereby perpetuating the species; that species is

traceable backwards to a local origin and a single pair; that all species vary—some more, some less; that their variations are due, partly to the influence of altered circumstances, and partly to constitutional causes, but are limited in their extent and transitory in their nature, the species remaining substantially as originally created; that the sterility of hybrids imposes an effectual barrier against the destruction of species.

2. It has been argued that new species are results, more or less remote, of spontaneous generation. As it has not been proved that inorganic matter is capable of originating living organisms, we may be excused for questioning whether the forces of nature, acting either from within or from without, could have generated new specific forms either directly or meditately, especially such forms as are acknowledged to have originated in past geological epochs.

3. It has been assumed that the introduction of new species is a result of the operations of a powerful, unconscious cause pervading all things. This explanation may be left to share the fate of the pantheistic system in which it is embedded.

4. The successive appearances of new species are now explained, with increasing frequency, by the theory which passes under the name of "Evolution." This theory may be briefly outlined as the realization of new specific organisms which were previously potential, their realization being under such conditions as prove them the legitimate outgrowth of anterior organisms. Starting with the assertion that species are mutable, and that consequently each may develop new types, which for some unexplained reason are improved forms—that the horse, for example, may have been developed from the zebra, the dog from the wolf, the rose from the daisy,

the bird from the fish—it culminates in the assumption that man by an almost infinite number of insensible gradations has been evolved from the orang-outang, or from the gorilla, certainly from some species of the monkey-tribe. This simial father of us all, it is assumed, was developed from some lower organism, which in turn owed its origin to a still less complex form, and so backwards to the germ of organic life, the slight changes, always resulting in improvement, having succeeded each other for millions of years ere man as a gibbering savage was ushered upon the world's stage. Varieties are incipient species. Species are varieties of a larger growth and an earlier divergence from the parent form; the difference is one of degree, not of kind. Neither was created; both have descended from an ever varying series of individuals, the one being only a more extended and slightly less plastic aggregate of insensibly fine gradations accumulated during an indefinitely protracted period of time.*

Herbert Spencer, in his *First Principles*, defines evolution as an "integration of matter and concomitant dissi-

* Haeckel, whose theory of evolution is decidedly atheistic, maintains that all living organisms have been evolved through millions of years from one or more very simple ancestral forms which issued by spontaneous generation from inorganic matter. He concedes that organic life had a beginning, and asserts that monera were developed by spontaneous generation at the bottom of the sea. Assertion, however, is not proof; nor is it easy to see how the assertion can be made good by satisfactory evidence.

Sir William Thomson expresses the belief that organic life was communicated to the earth by a germ or germs conveyed in a meteor or meteors from some other planet. A simple hypothesis.

There are other evolutionists who prefer to believe that God, millions of years ago, called a primordial form, a simple cell, into being, and since that time has had no more to do with the universe than if he did not exist. The clock being once wound up was left to tell off its fated periods.

"Neither so do their witness agree."

pation of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation" (p. 396).

This definition is an evolution out of a protracted series of arguments as presented in several consecutive chapters. In its successive stages, it assumed the following forms:—"We shall everywhere mean by evolution, the process which is always an integration of matter and a dissipation of motion" (p. 286); "Evolution is definable as a change from an incoherent homogeneity to a coherent heterogeneity" (p. 360); "Evolution is a change from an indefinite, incoherent homogeneity, to a definite, coherent heterogeneity, through continuous differentiations and integrations." This last mentioned form Professor Tait translates as follows: "Evolution is a change from a nohowish, untalkaboutable all-alikeness, to a somehowish and in-general-talkaboutable not-all-alikeness, by continuous somethingelseifications and sticktogetherations."

Even Spencer's most elaborate definition finds itself the victim of the evolutional process, for on page 430, after supposing we had grasped the whole truth, we are startled by the announcement, "The continued changes which characterize evolution, in so far as they are constituted by the lapse of the less heterogeneous into the more heterogeneous, are necessary consequences of the persistence of force." Alas, the definition is not through its transformations and improvements; on page 458 we read, "A part-cause of evolution is the multiplication of effects; and this increases in geometrical progression as the heterogeneity becomes greater." Are the flukes of our anchor now fast in the crevices of unchangeable truth? No; "Evolution can end only in the establish-

ment of the greatest perfection and the most complete happiness" (p. 517). "And thus there is suggested the conception of a past during which there have been successive evolutions analogous to that which is now going on; and a future during which successive other such evolutions may go on—ever the same in principle but never the same in concrete form" (p. 537). "The one [spirit] no less than the other [matter] is to be regarded as but a sign of the Unknown Reality which underlies both."

Darwin, who may claim the honor of occupying a foremost rank among evolutionists, holds the generally accepted view of the descent of all the individuals of a species from a single birth-place and from one ancestral form, each species having subsequently established itself as widely as possible. He denies that species are an independent creation, and persists in regarding them as only varieties of a very early date; genera he looks upon as ancient species. The inherent predisposition in plants and animals to vary has sufficed, in conjunction with the causes originating in the intense struggle for existence, to modify all species and to produce the present diversity. All living organisms, he thinks, have been evolved from four or five primordial forms. "I believe," he says, "that all animals have descended from at most only four or five progenitors, and plants from an equal number." Again: "Possibly all the original beings which have ever lived on the earth are descended from some one primordial form into which life was first breathed." He does not regard variability as a necessary contingency of organic beings under all circumstances; he maintains that there are no species which refuse to vary provided they are placed under conditions favorable to the production of variations, and he affirms

that when once a species has begun to vary, its varieties are more and more subject to variation. He asks, "How could a savage possibly know, when he first trained an animal, whether it would vary in succeeding generations?" Hence he infers that the animals which savages originally chose for domestication had no extraordinary inherent tendency to vary; varieties, he affirms, often vary more under domestication than distinct species in a wild state.

It may as well be frankly acknowledged that many and serious difficulties environ any hypothesis which we may choose to adopt. If we say that each new species, as it originated in some period subsequent to the dawn of life upon the earth, was an immediate creation of God, we seem to array ourselves against the Mosaic account; we certainly bring ourselves into conflict with the usually accepted interpretation. If we say that species, as they have successively appeared in geological eras, may have originated in spontaneous generation, we not only impose upon ourselves the task of proving that life can originate and actually has originated in certain combinations of inorganic matter, but we take a long stride towards materialism. If we say, new species have been evolved from pre-existing species, without the superintendence of an intelligent agent and without having been previously latent in parental forms, we accept evolution. If we say they are the natural unfoldings of forces originally communicated to the several species which were called into being by a direct fiat of the Divine Will, we accept a species of evolution and expose ourselves to renewed attacks from those who persist in affirming that if new species may originate in this manner, we ought not to assume that God did more originally than create one germ of life capable of

evolving all vegetable and animal organisms; indeed, that we ought to concede this. He may have imparted to oxygen, hydrogen, nitrogen, and carbon, when subjected to the influence of electricity, the power of originating protoplasm, or the physical basis of life.

We cannot insist too strongly that the question under discussion is not what is a possible or conceivable or probable way in which species originated, but what is the particular mode in which they actually originated. It is perhaps possible that the struggle for existence, which some evolutionists imagine they have forced upon the christian church, may yet evolve a second Bishop Butler; if this should prove to be the case much of the *a priori* reasoning of modern scientists would become, in his intellectual grasp, mere hay, wood, and stubble, in the burning of which new light would be thrown on Final Causes. The questions connected with the origin of new species, if ever settled, must be settled by induction, not by *a priori* arguments.

This new theory, now so vigorously advocated by an increasing number of those who are making the origin of species a special study, can scarcely be considered a recent evolution from man's fertile brain. It was first propounded, though in crude form, by Aristotle in his *Generation and Development of Animals*. In 1759 Casper Friedrich Wolff, a careful observer and an acute reasoner, presented to the world his *Theoria Generationis*. The publication of this work in reality marks the birth of the theory of evolution. It made very few converts, however, during the life-time of its author, who received liberal installments of embittered prejudice and no small amount of ridicule. The work, however, produced results fifty years later. In 1809 Juan Lamarck presented the same views, in his *Philosophic Zoology*.

gique, in more captivating form, though his reasoning was less cogent and his array of facts more wearisome. He attempted to point out the steps by which nature in former times proceeded in her development of one class of beings from another, endeavoring to establish a graduated scale with the lowest organisms at one end and the human species at the other. He even essayed to prove that man's intellectual, moral, and religious faculties were the same in kind as those possessed by the brute creation—simply improvements. Fifty years later the world was presented with Darwinism, the popularity of which is in singular contrast with the reception given to the development hypothesis in preceding ages, and is, in the judgment of some, one of the marvels of this century. It is difficult to explain its rapid progress unless we concede that scientific studies were tending in this direction. The interesting style in which it is presented and the apparent fairness in the methods of reasoning have been efficient agencies, it is believed, in bringing about such extended results in a comparatively brief period of time.

Whilst evolutionists agree in asserting that new species have been evolved from pre-existing organisms, there is nevertheless great diversity of opinion as to the agency by which these changes have been effected. The following have been assigned:—

1. New specific forms have been regarded as the results of a "fortuitous concurrence of circumstances." This is only a wordy method of confessing an inability to explain the phenomena, and reminds one of the old dialecticians, who attempted to answer the question, "Has the ideal exemplar of species an existence independent of the individuals which constitute the species."

2. St. George Mivart believes that species possess an

inherent power of producing new species. This solution, though entirely consistent with a theistic view of evolution, is environed with difficulties. To say that in addition to the power which maintains species for such an indefinitely lengthy period of time there is also an innate energy capable of destroying the marks and breaking down the limits of species is a solution which many naturalists refuse to consider satisfactory.

3. We have the theory of Mr. Charles Darwin that the transmutation of species is gradually but surely effected by "natural selection," "the survival of the fittest," "the struggle for existence." This hypothesis, though embodying much and explaining not a few of the facts, is not viewed, even by a majority of evolutionists, as an adequate explanation—indeed, not a few careful students of Darwin deny that he assigns any efficiency to "natural selection" in the origination of new species, affirming that he merely regards it as the mode in which unknown causes operate in the production of the results. If he designs it as an agency, St. George Mivart's work furnishes theologians with an unanswerable argument against this particular form of evolution.

So far at least as regards the agencies by which evolution has been effected, the defenders of the Mosaic account of creation can scarcely be called upon to assume the defensive till their opponents have agreed, with at least reasonable unanimity, upon some hypothesis that will bear the test of a rigid scientific investigation. That no such hypothesis has been presented is conceded in the fact that so many are engaged in demolishing others' theories in order to clear the ground for the establishment of their own.

Those who have attempted a refutation of evolution have also undertaken to assign causes adequate

to produce the changes which are known to have occurred.

1. It has been maintained that new species are results of some constitutional affection of parental forms. This explanation was pressed with great vigor in the earlier discussions upon this subject. It is now abandoned, it being conceded that sensitive as the reproductive system is, and many as are the diseases of parent organisms, such causes are inadequate to the production of new species.

2. Others, when the subject was less thoroughly understood than it is at present, were disposed to consider the changes as mere freaks of nature, such as produced the porcupine-man and his descendants. This unscientific explanation has had its day and is no longer worthy of mention except as a specimen of the subterfuges to which even profound reasoners will sometimes resort.*

3. It has been said, the changes result from the action of climate upon constitutional tendencies. It is admitted that varying degrees of heat and altered modes

* Francis Turretin, a distinguished Protestant Professor of Theology, whose writings have sustained an enviable reputation even to the present day, asks, "Do the sun and the moon move in the heavens round the earth, while the earth remains at rest?" He answers, "Yes, in opposition to certain philosophers. First, The sun is said in Scriptures to move in the heavens, and to rise and set. Second, The sun by a miracle stood still in the time of Joshua; and by a miracle it went back in the time of Hezekiah. Third, The earth is said to be fixed immovably. Fourth, Neither could birds, which often fly off through an hour's circuit, be able to return to their nests; for in the meantime the earth would have moved four hundred and fifty miles. Fifth, Whatever flies or is suspended in the air ought, by this theory, to move from west to east; but this is proved not to be true from arrows shot forth, atoms made manifest in the sun, and down floating in the atmosphere."

The same author presents a series of labored arguments to prove that man must have been created in the autumn—if not, he would have starved to death ere he could have raised a crop, or found it prepared to his hand by bounteous nature.

of life may produce new varieties—can it also produce new species? Sufficient evidence to prove this has not been presented.*

It is not claimed, however, that the doctrine of evolution is refuted by showing that its advocates are unable to agree in reference to the agencies by which new species are developed from antecedent organisms. It is conceivable that they should succeed in establishing a law of evolution without being able to specify the causes which produce the ever changing series of effects; indeed, to regard the theory as absurd, especially in its more modest pretensions, is to acknowledge ignorance of the facts, or to confess oneself under the influence of strong prejudice; on the other hand, to view the theory as fully established, even to the furthest limits to which it has been pushed, is to proclaim oneself satisfied with evidence that is less than sufficient to enforce conviction. It seems the dictate of prudence to concede that at present it is difficult, practically impossible, to fix the limits of species; more difficult still to fix those of genera; simple folly to attempt to determine those of tribes and families. We may console ourselves, however, with the fact that a system of faith which outlived the scientific dictum of the fixity of the earth can easily display vitality sufficient, if neces-

* In Corsica, horses, dogs, and other animals become beautifully spotted. It is also said that sheep when taken to the West Indies lose their wool and become covered with hair: in Guinea, they undergo such changes as to bear little resemblance, except in bleat, to those in Europe, the wool giving place to black or brown hair. Dogs taken to the mountains of India are said to become covered with wool. In Boeotia the herds are generally yellow, in the Roman Campagna uniformly gray, in other parts of Italy commonly red. The camel's hump, as that of the Indian cow, is supposed to have arisen from a fatty deposit in consequence of exposure to heat, being a deviation, it is asserted, from the original type. European dogs, taken to foreign countries, have been known to degenerate greatly, the ears becoming long and stiff, the bark turning into a hideous howl.

sary, to survive even after the doctrine of the immutability of species has been reverently laid away in the roomy receptacle of perished beliefs. We shall only be forced to acknowledge that the permanence of species is a doctrine which is in no sense needed for the defence of Scripture.

Whilst it would be presumptuous to pronounce the theory baseless, it would be no less so to affirm that it satisfactorily explains all the phenomena; it would in fact be to array oneself against able reasoners who oppose it, not on theological grounds, but on scientific. Professor Agassiz says, "I wish to enter my earnest protest against the transmutation theory." Even Darwin concedes, with a frankness characteristic of his writings, "The transitional forms, joining living and extinct species, not being found—the sudden manner in which several groups of species first appear in European formations—the almost entire absence, as at present known, of formations rich in fossils beneath the Cambrian strata—are undoubtedly difficulties of the most serious nature. We see this in the fact that the most eminent palæontologists, namely, Cuvier, Agassiz, Barrande, Pictet, Falconer, E. Forbes, etc., and all our greatest geologists, as Lyell, Murchison, Sedgwick, etc., have unanimously, often vehemently, maintained the immutability of species." Again: "Authors of the highest eminence seem to be fully satisfied with the view that each species has been independently created."*

* Haeckel, who in the preface of his work entitled, *The Evolution of Man*, expresses great contempt for so-called revelations and for "the black mischievous host [the defenders of Scripture] against whom modern society has at last taken up the struggle for culture," sees fit to indulge in the following empty boast:—"When in 1873, the grave closed over Louis Agassiz, the last great upholder of the constancy of species and of miraculous creation, the dogma of the constancy of species came to an end, and the contrary assumption—the assertion that all the various species descended from common ancestral forms—now no longer encounters serious difficulty."

At present, however, it is perhaps safest to concede that the permanent and complete immutability of species has not been proved: neither has mutability been proved.

In respect to this question, as to many others, it is wise to permit the mind to remain in suspense. It is easy to err. Leibnitz pronounced Newton's theory of gravitation subversive of natural religion. Until a comparatively recent date two hypotheses in reference to the nature of light claimed the suffrages of the learned. The emission theory, though for a long time vigorously defended by a majority of naturalists, has given place to the undulatory. A small minority of reasoners won the victory. The adoption of the wave theory of light soon led to the hypothesis of the correlation and transmutability of light, heat, electricity, and magnetism. This hypothesis, after running the gauntlet of an incessant fire is now generally adopted. The nebular hypothesis, though strong objections have been urged against it, many of which are as yet unanswered, is now accepted as harmonizing accepted facts into a probable and consistent whole.

Christianity, notwithstanding the accumulation of cogent arguments and in face of the affirmation boastingly made, "The Bible is refuted," can well afford to wait till its opponents have become reasonably well united upon an accurately defined position. Till this measure of unanimity is secured, we are not called upon to decide whether we will surrender the Mosaic account, adopt a new interpretation thereof, or undertake a refutation of the theory. Why should we waste our energies upon an imaginary foe whilst the mailed warriors of sin are confronting us?

CHAPTER II.

IS IT ATHEISM?

SINCE then the term evolution is restricted in meaning to the production of new forms of matter, or new living organisms, the question arises, Is evolution necessarily atheistic? The theist is not called upon to prove that it may not assume an atheistic form; nor to deny that in the hands of some of its advocates it is decidedly hostile to the teachings of Scripture. He is merely called upon to decide whether evolution proper, aside from its unnecessary concomitants, is essentially atheistic; whether there is such an array of well-established facts, as to preclude the possibility of belief in some theistic form of the theory. May he not accept evolution while still retaining confidence in God's Word? May he not announce himself an evolutionist without conceding that man has been evolved from a moneron? If he so elects, is he not at liberty to maintain that evolution is a possible explanation of a large class of phenomena, while he still maintains that it cannot account for man's origin, for the origination of plant-life, for the genesis of animal organisms, for the origin of matter?

While conceding that evolution may be an adequate cause for the production of new organisms from pre-existing forms, may he not discover a solution of many questions to which teleology has as yet rendered no satisfactory solution? Indeed, is it not possible that

he will find evolution an efficient instrumentality in strengthening the foundations of Revealed Religion? We confidently believe he may. This, Henry Drummond, in his *Natural Law in the Spiritual World*, has made apparent.

Most of our readers, probably, are prepared to believe that the objections to the theory in question are scientific rather than theological. They are disposed, no doubt, to concur in judgment with the Duke of Argyll, and to reiterate his affirmation, "It [the development hypothesis] is not in itself inconsistent with the theistic argument, or with belief in the ultimate agency and directing power of a creative mind. This is clear, since we never think of any difficulty in reconciling that belief with our knowledge of the ordinary laws of animal and vegetable reproduction." If it could be proved that new species, as well as individuals, are produced by being born, it does not diminish, but rather increase the necessity of admitting the existence of an Infinite Intelligence as the cause of all we witness in nature.

The word "create" is susceptible of three significations. 1. It may mean to bring into being by the simple exercise of power, without pre-existing material and without process—absolute creation. In this sense none but God can create. Did He originate the earth as it now is from nothingness, or did He simply create the materials and the forces which produced it? Did He, from non-entity, call into being the different species of plants and animals, or did He make preparation for their production by creating one or more primordial forms capable of evolving all living organisms? Did He simply create an atom of matter capable of evolving a universe? If scientists should succeed in proving that the universe, with its millions of living beings, has been developed from a

single atom, they will not have laid an immovable foundation for atheism until they have proved that that atom needed no Creator. 2. It may mean to bring into being, through the agency of secondary causes and under established laws, that which did not previously exist—derivative creation. Were the different species of plants and animals evolved, independent of a direct and immediate divine agency, or is evolution simply the mode of Divine operation? 3. It may mean to fashion. Did successive species arise in the absolute creation of new germs of life, or did Divine energy simply invest pre-existing forces of life with new forms?

These commands—"Let the earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself," " Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind"—are apparently an emphatic assertion that God created all the living beings that have peopled the earth. To say the least the interpretation which assumes that God imparted to organisms the potentiality to evolve new forms is as natural as the assumption that the passages were meant to teach that no species has arisen, or can arise, except by the absolute exercise of Divine sovereignty.

If then it shall hereafter be proved that instead of creating species God merely created, as Darwin thinks, at most not more than three or four cells susceptible to the influence of light, heat, and electricity, and capable of producing all the species of plants and animals that exist or have existed, it certainly does not follow that the foundations of belief in the being of God are destroyed. Professor Huxley says: "It is necessary to remark that there is a wider teleology, which is not touched by the

doctrine of evolution, but is actually based upon the fundamental proposition of evolution."

Apparently, one chief reason why the theory in question has been considered atheistical is because most of its advocates, like Darwin, have persisted in attributing the power of originating new species to some supernatural and self-existent energy resident in pre-existing species. They have seemed resolutely determined to account for every modification without assuming the existence of any power out of or above nature, either during the transformation or at the origin of the parent forms.

Whilst some are endeavoring to destroy belief in the Mosaic account, and to subvert, if possible, the foundations of a theistic conception of the universe, others are laboring, with commendable assiduity, in accumulating arguments fitted to prove that there is nothing in evolution which conflicts with Scripture and no statement in the revealed account of creation which militates against the theory of development. Mivart says, "Naturalists generally assume that God acts in and by the various laws of nature." And this is equivalent to acknowledging the doctrine of "derivative creation." With very few exceptions, none deny such Divine concurrence. The Duke of Argyll says in his *Reign of Law*, "There is nothing in religion incompatible with the belief that all exercises of God's power, whether ordinary or extraordinary, are effected through the instrumentality of means—that is, by the instrumentality of natural laws brought out, as it were, and used for a Divine purpose." Professor Huxley affirms, "The more purely a mechanist the speculator is, the more firmly does he assume a primordial molecular arrangement, of which all the phenomena of the universe are the consequences; and the more completely thereby is he at the mercy of the teleologist

who can always defy him to prove that this primordial molecular arrangement was not intended to evolve the phenomena of the universe." Owen says, "Organisms may be evolved in orderly succession, stage after stage, towards a foreseen goal, and the broad features of the course may still show the unmistakable impress of Divine volition."

Evidently, progressive development is not necessarily hostile to theism, nor to any statement contained in Scripture. The volume of nature, we may be sure, contains no record inconsistent with a revelation direct from the Author of nature. There may be some slight degree of inappropriateness in applying the term "creation" to those organisms which were only potentially called into being, but is there less inappropriateness in employing the term "evolution" unless we concede that what was evolved must have been originally resident in primordial forms? If, on the other hand, it is affirmed that the power of originating new species was not imparted to parent germs, then, evidently, the term "creation," as applied to this gradual, ill-defined and causeless process, is as accurate as the term "evolution": nay, more so, for it does not leave the mind groping for a cause adequate to the production of such mysterious effects.

To prove the possible or actual descent of species from pre-existing forms by insensibly fine gradations during protracted periods of time is one thing; to disprove theism is another. "The discoveries of science," says Laplace, "throw final causes further back": who can legitimately affirm that they lead logically to atheism? Do they destroy the argument for the being of God founded upon the evidence of design in the works of nature? Do they even weaken the reasoning? Certainly this has not been proved.

Of an efficient cause there are three views which are at once philosophical and theistic. 1. The action of the First Cause may be immediate, direct, constant, and though diversified, uniformly according to certain laws. 2. Forces previously communicated may be occasionally arrested and direct action engrafted upon the system, new forces being imparted and unforeseen results produced. 3. Matter at its creation may be endowed with forces which produce all the phenomena as the successive centuries roll by. Until we are forced to surrender each of these citadels we need not capitulate.

The new theories have not "evolved" a new issue between the atheist and the theist. The issue still is, as it always has been, whether organic nature is the result of design or of chance. Does the adoption of "evolution" affect the doctrine of final causes? Is Darwinism incompatible with the idea of design in the universe? Its author rejects spontaneous generation. His hypothesis has to do, not with the cause of the phenomena, but with the mode of their manifestation, thus leaving the question of design untouched. Are we to conclude that the diversification of organic forms, consequent upon the struggle for existence or upon other secondary causes, excludes the possibility of design? Certainly not. Unless an evolutionist affirms that the causes to which he refers changes are self-sufficient, he is not open to the charge of atheism. For him to make any such affirmation would be imprudent, not merely because the statement may be incapable of proof, but because a theistic view will in measure save him from the necessity of accounting for the absence of intermediate forms: for if the transformations occur accompanied by design there will of course be no purposeless transitional

varieties; no senseless productions of fortuity, born but to suffer, and existing but to perish.

To concede, as has sometimes been done, that the doctrine of evolution destroys the foundations of the teleological argument for the being of God, leaves no alternative but an unqualified denial of the theory, and a denunciation of it as unscriptural and atheistic. To brand scientists as "infidels," "unbelievers," "materialists," "atheists," is as prejudicial to religion as it is to science. There is no argument in opprobrious epithets.

The wisdom of squarely arraying ourselves against such a body of men is questionable, especially when our own ranks are divided and the disaffected are increasing in number. It is prudent not to assume a hostile attitude when in the judgment of able defenders of Scriptural truth it is as probable that all extinct and all living beings have been developed by natural laws of generation from pre-existing forms as that each species owes its existence to a single creative fiat. Is it not wiser to examine whether it is possible to save the argument from design, leaving our opponent to expend his energies in amassing materials which may be of service to us when we shall have driven him routed from the field? If the theory of evolution is fatal to teleology the *onus probandi* rests upon the evolutionists. They may find it a burden too heavy to bear; weightier than the establishment of their theory upon a scientific basis.

If evolution is true, not all is lost; nay, perhaps something is gained. Is the assumption that there is a material connection between the members of a series of organized beings inconsistent with the idea that this connection is the result of a force imparted at creation? Is there any greater difficulty in concluding that the theory in

question is as compatible with a theistic view of the universe as is the theory of gravitation, or the nebular hypothesis? Are those scientists to be pronounced atheists who prove that heat, light, electricity, magnetism, and even mechanical power are transformations of one and the same force? This, which many reasoners concede has been established, and which is regarded as one of the greatest triumphs of science, is not looked upon as atheistical. Why then regard "evolution" as atheism? If animals and plants have been endowed with the power of evolving new species after the lapse of centuries, the argument from design is not weaker than when it did noble service in the hands of Paley; for it cannot be proved that this complicated series of events results independent of a continued divine agency. When it shall be shown that the eye, with its marvels of ingenious mechanism, has been constructed under the operation of natural selection, the struggle for life, continued variation, or the survival of the fittest, some future Paley will find no great difficulty in proving that the Creator has left upon His handiwork innumerable traces of intelligent design. Suppose two organisms, A and Z, possess evidence of design, will the subsequent discovery that there are intermediate organisms for every letter of the alphabet, each owing its existence to an immediate ancestor, weaken the evidence of design? If the eye may be developed from a sensitive nerve—the process of formation requiring ages ere it reaches completion—who is logician sufficient to prove that it was neither a part of the original purpose, nor the result of a co-operating Divine Intelligence? If the hand may be evolved from a rudimentary hoof, through numberless living beings, each succeeding organism presenting evidence of slight improvement towards the consummation, who has a legitimate foundation for the

assertion that this state of things cannot co-exist with design? If the Creator imparted this power to the original organism, or if this is the mode of construction which in His perfect wisdom He chooses to adopt, who will presume to assert that evidences of design are obliterated?

It is true that Darwinism by its apparent substitution of Natural Selection for design seems to have taken a step towards atheism; for if intelligence is unnecessary after certain primordial forms are in existence, we are prompted to ask, Why is it necessary to the origination of these infinitesimal germs? Some bold speculator may prove, as Haeckel thinks he has, that these were evolved by natural laws from inorganic matter; a still bolder speculator may affirm that inorganic matter is eternal and self-existent. That, however, which passes under the name of Darwinism is not evolution, strictly speaking; but a mode of evolution; and if we shall be forced ultimately to concede that Natural Selection is the cause of variation, and not simply the mode, will it be possible to resist the conviction that there must have been design in its employment? Besides, if it can be proved that an original germ of life was evolved from matter, we are not compelled to adopt the revolting atheism of Haeckel. The efficient cause is simply removed to a greater distance—run further up the almost infinite chain.

To prove that all the changes which have characterized the animal and vegetable kingdoms have occurred without the intervention or directing agency of an Intelligent Cause will be difficult; and when this is accomplished, the argument from design will be in no degree weakened. On the other hand, if these variations are of the nature of origination and occur under the guidance of Divine Omniscience, secondary causes being employed

to produce them, there is an increase of strength imparted to the teleological argument. Consequently we are at liberty to assert that if Darwinism should become an established theory, if evolution in its widest sense should win for itself an impregnable position in science, there is no just cause for fear. Unlike Othello, the theologian's occupation will not be gone. He is a personage whom the human family could not spare, even if scientists should succeed in forcing him to acknowledge a nearer relationship to the simial family than his inherited notions permit him at present to fancy.

Pictet says, "Darwin's theory accords very well with the facts of comparative anatomy and zoology—comes in admirably to explain unity of composition of organisms, also to explain rudimentary and representative organs, and the natural series of genera and species—equally corresponds with many palæontological data—agrees well with the specific resemblances which exist between two successive fauna, with the parallelism which is sometimes observed between the series of palæontological succession and embryonal development."

Perhaps the theologians of the future may discover that evolution accords singularly well with classes of facts previously inexplicable. It may possibly be viewed as harmonizing purpose and the adaptation of means to the proposed end, as explaining the unity of type which prevails under similar conditions of life, as the complement of the geological theory which maintains that there is no absolute break from the present era back to the azoic, as furnishing a satisfactory explanation of the gradual and steady progression within each class and order, as accounting for the unexplained fact that the species of the tertiary period are found occupying the same regions as their descendants now occupy, as encouraging the assertion

that there is evident design in the existence of rudimentary organs, as affording a solution of the singular fact that there is a natural series of tribes, families, genera, species, varieties. Perhaps it may aid also in explaining the fact that propagation by budding or offshoots extends through the lower order of animals as well as plants, that between partheogenesis and sexual reproduction there is a curious and intimate series of gradations, that individuality is not attained by a single leap, that sutures which in the skulls of mammals are supposed to have been designed to aid parturition should exist also in birds and reptiles where their presence is certainly no aid to birth, that individuals and even entire races should exist under conditions which evidently might be modified to advantage.

It may be said, however, in refutation of the reasoning that evolution, if established, would strengthen the argument from design, that of the millions of possible variations only a few are selected which are improvements from a vast number which are not improvements, but perhaps degenerations. To this it may be replied—of the millions of rain-drops that leave the ocean only a few reach their intended destination. Is there no design? Of the pollen that is formed each year, for the purpose of perfecting seeds in plants, only a small part attains the end of its creation. We do not hence conclude that its existence is purposeless. Myriads of fish-ova float in the water—only a few, comparatively, become fish. Each peach is the representative of perhaps thousands of blossoms which came to nought. The waste of nature is enormous—seeds, eggs, germs, infant life. The organisms which perish ere they commence individual development vastly outnumber those which leave successors. Destruction is the rule: life the exception. Not one prob-

ably in ten million comes to perfection. Was the design destruction, or was there no design? Must disteleology be allowed to take the place of teleology? The light of the sun is diffused in all directions—only a small portion strikes the planets. Is purposelessness written on the leaves of nature's great book? Why this immense waste everywhere? Our present teleology can give no answer. The teleology which will be possible, if evolution becomes an established theory, shall be able to answer,—Unless there were competing multitudes there could be no struggle for existence; if there were no struggle for existence, there could be no natural selection; if there were no natural selection, there could be no such thing as the survival of the fittest; if there were no survival of the fittest, there could be no improvement in species, no new varieties resulting from adaptation to changed circumstances.

The new teleology may prove more successful than the old. The theistic view of nature may have a more secure foundation than it now has. Design under existing theories leaves more unexplained than it explains—failures of provision, waste of resources, abortive organs, the perfection of certain organs in some species whilst only partially developed in some and functionless in others, the presence of hair on the human body (hair, in unclothed animals, was a necessary covering), the existence of members having at present no physiological significance—as the membranes, muscles, and cartilages in and about the human ear (of use in animals which move the ears freely), the crescent-shaped fold at the corner of the eye (corresponding to the nictitating membrane in sharks, and to the third eyelid in birds and some ruminant animals), the free projecting tail of the human embryo at a certain stage in its develop-

ment,* unused muscles beneath the skin (corresponding to those by which animals wrinkle the skin to remove flies), useless ducts in the vascular system (active blood-vessels in some animals), organs in one sex which are only rudimentary in the other, as seed-ducts in females, ova-ducts, uterus, mammae and mammillary glands in males. If it shall ever be proved that man is descended from apes, we shall possess the means of explaining these and similar facts. At present they are an enigma.

Though a theistic view of evolution is possible, we are certainly far from affirming that no evolutionists present it as a theory which is decidedly atheistical. They certainly do. Haeckel, after conducting the reader through a lengthy discussion—in which the words ontogenesis, ontogeny, phylogenesis, phylogeny, anthropogenesis, anthropogeny, palingenesis, kenogenesis, etc., † become inexplicably commingled with insults hurled at those who accept time-honored beliefs—expects the bewildered reader to accept atheism and disteleology. He seems to think that he has forced even reluctance to accept his assertions: “The descent of man from the lower animals

* “The history of the germ,” says Haeckel, “is an epitome of the history of descent: the series of forms through which the individual organism passes during its progress from the egg-cell to its fully developed state, is a brief compressed reproduction of the long series of forms through which the animal ancestors of that organism have passed from the earliest periods of so-called organic creation down to the present time.”—*Natural History of Creation*, p. 6.

† *Ontogenesis*, the origin of living organisms.

Ontogeny, germ-history, an account of the changes undergone by germs prior to their entrance upon individual existence, including a history of the human egg.

Phylogenesis, the origin of tribal germs—species.

Phylogeny, tribal history, a history of the transmission of germ-forms from an indefinitely remote past.

Anthropogenesis, the origin of man—an ape ancestry.

Anthropogeny, a history of man’s descent from a simple cell, through monera, worms, etc.—twenty-one links—to that degree of development to which

is a special deductive law, necessarily following from the general deductive law of the entire doctrine of descent:" "These sure proofs [of man's descent from apes] have been for some time available to all who would open their eyes to see them:" "Many millions of years must indeed have elapsed while the most perfect vertebrate organism, man, gradually developed from the primeval one-celled ancestral organism. The opponents of the development theory, who regard this gradual development of man from lower animal forms, and his original descent from a one-celled primitive animal as incredible, do not reflect that the very same marvel actually occurs before our eyes in the short space of nine months during the embryonic development of each human individual.—The same series of multivariously diverse forms, through which our brute ancestors passed in the course of many millions of years, has been traversed by every man during the first forty weeks of his individual existence within the maternal body:" "The human body includes no single organ which is not inherited from apes, but we can trace the origin down to lower ancestral grades:" "The human mind has been developed with and as the function of the medullary tube:" "All phenomena are produced by mechanical causes, not by prearranged, purposive causes:"

phylogeny, the mechanical cause of ontogeny, has evolved him, as is indicated by ontogeny, which is but a recapitulation of phylogeny.

Palingenesis, reproduction of forms, inherited evolution.

Kenogenesis, a vitiation of the history of forms, or vitiated evolution.

Biogeny, a history of organic evolution, biology being a science of the forces of life in general.

Heterotopy, displacement of phenomena affecting place.

Heterochrony, displacement of phenomena affecting time.

"In all cases the duration of the ontogeny appears infinitely brief when compared with the enormous, the infinitely long period during which the phylogeny or gradual development of the ancestral series, took place." "The period is measured by thousands and millions of years."

"There is no such thing as free-will in the usual sense."

Fearing his readers might charge him with entertaining materialistic conceptions of the universe, he assures them that his views are as far removed from materialism as they are from spiritualism; that he neither pronounces vital phenomena effects of matter, nor of motive force; that he neither regards matter as preceding force, nor force as preceding matter, but that he adopts "monism," which can as little believe in force without matter as in matter without force, there being no matter which does not possess force, and no forces which are dissevered from matter—those forces which produce motion being designated active, those which produce equilibrium being called latent.

CHAPTER III.

MAN'S PHYSICAL NATURE.

HOW does the foregoing theory stand related to the origin of man's physical nature? Does it furnish a satisfactory answer to the question, Whence came the human body? Is this garment of the soul the result of an evolution from less complex organisms?

The theory, however successful elsewhere, is a conspicuous failure when it assays the task of explaining man's origin. To affirm that the human family, a new species, has been developed by the transmutation of previously existing species, is an infelicitous mode of expression, it being difficult to assign any reason why the term species should be employed: if the hypothesis be true, it is apparently impossible to determine when the manifestation of the old specific form ceased and that of the new began. Why say, "Man's progenitor was some species of monkey," if the latter by insensible gradations glided into the former? This destroys the idea of species. If the changes pertain to individuals, they cannot be considered as proving the mutation of species.

Admitting that by care in the selection of individuals, a few more feathers can be developed in the tail of a pigeon, as Darwin succeeded in producing, does this prove that man owes his origin to some lower organism? Conceding that the lion has been slightly improved during the last two or three thousand years by the survival

of the fittest or by the inherent power of species, does it follow that the first man was the son of an ape? Admitting that mackerel have become larger and better adapted to wage warfare with their enemies, does this furnish any evidence that the moneron was the primeval parent of the human family? Does it even prove that mackerel were evolved from an inferior organism? or that they will eventually evolve a new and improved organic form?

If species are mutable, why do we fail in discovering evidences that changes have taken place during the period covered by history? The bee has been industriously engaged in extracting sweetness from flowers since the days of Aristotle. The ant, ever since Solomon recommended its example to the sluggard, has been practicing building, and hoarding provisions against a time of need. There is no evidence that either has acquired a single new organ, or has more perfectly developed organs previously possessed in rudimentary form, or has unfolded new instincts from potential germs. Egypt, in its mummies as well as in its paintings, has preserved for us a museum of natural history whose specimens were collected thirty centuries ago; and yet in no respect do they differ from species now existing.

We are asked to believe that the ape-tribe developed new organs, highly intellectual faculties, and even moral perceptions; and yet, though man has been striving after new powers for thousands of years, there is no evidence that he has acquired new faculties, or developed new organs; not one single channel has been opened, no new perception has been gained, not one of the five senses has become more extended in its range; nay, even the simial family has lost the power of improvement, having remained stationary for the last thirty centuries. Add

to this the fact that there is abundant evidence that all organisms have remained substantially the same since the earliest historical period, and it seems incredible that the gorilla should be the ancestor of the human family.

It is assumed that the ape-family, and every species of plants and animals, possesses an innate tendency to improve; this is sometimes pronounced "spontaneous," sometimes it is called "an accidental variability." The existence of the law has not been proved, however, but assumed. Are we not justified in asserting,—The existence of such a law should be established before sweeping deductions are made therefrom; at least stronger arguments should be presented than those which connect themselves with Natural Selection, which, for all that appears to the contrary, may be nothing more than an agency which accumulates and preserves slight increments of improvement, but is powerless in producing them, leaving the problem of favorable variations unsolved. Hypothesis, unless it harmonizes with the facts and furnishes a consistent and reasonable explanation, ought not to be regarded as having attained to the dignity of a theory.

For anything that has been satisfactorily shown, these improvements may be due to reversion, that is, the regain, of lost characters. The struggle for existence, which is pronounced severe, may cause degeneration. Under domestication, or under more favorable conditions in nature, there may be a recovery of lost qualities. This explains the facts as well as Darwinism explains them, perhaps better; and it destroys the basis of the assumption that improvement may continue indefinitely. A limit exists. Darwin admits that characters which have been lost may lie in the organism for thousands of gener-

ations with their powers of redevelopment undiminished, and that under favoring circumstances there is a gradual and constant improvement, an approach towards the lost type.* It would seem, therefore, that neither improvement nor the preceding degeneration is necessarily due either to selection or to an innate tendency. Advance may result from the presence of conditions favorable to improvement; degeneration, from the absence of such conditions. Darwin concedes that the latter has taken place on a very extended scale, having invaded every known species. He seems even to have concluded that all improvements may be results of reversion.

Nor is evidence wanting that reversion is a law similar to well known laws. There is in nature the power of reparation, even to the extent of reproducing a lost member. A crystal, when one of its edges has been broken off, if placed in a solution similar to that in which it was first formed, will reproduce its lost edge, repairing its integrity. Until the edge is reproduced there is an imperfect equilibrium of forces. Would it be correct to say, The improvement of the crystal is limitless?

Since this progressive development is a virtual destruction of species, as Darwin's theory of pangenesis is a destruction of individuals, it seems easier to accept the Scriptural account, which, however distasteful, is apparently environed with fewer difficulties.

It is contended, however, that long periods are a necessary factor in these transmutations, the difficulties being diminished or removed by the assumption of an indefinite period through which improvements have been accumulating. How four hundred millions of years could

* *Origin of Species*, pp. 160-161. He affirms on page 161, "It must generally be left doubtful what cases are reversions to a formerly existing character, and what are new and analogous variations."

aid in removing the difficulty is not easy to see. If it has not been proved that within the historical era any species has passed beyond the barriers which separate it from allied species, there is assuredly little evidence that the mere lapse of centuries would effect any marvelous transformations. Moreover, there is a strong probability (quite as strong as the presumption that species are mutable) that the earth has not been adapted to animal life for millions of years—probably not even for a million, a period far too brief, evolutionists would think, for the changes which have occurred.

In order to account for the phenomena, the theory in question is under the necessity of attributing an almost prescient intelligence to the ape-family; for how else shall we explain the development of human organs during their incipient stages? And even the highest intelligence conceivable seems inadequate to account for changes which, during their progress, and until the transformation was nearly or quite complete, must have been positively detrimental. During the entire period that the fore-feet of the gorilla were developing into hands, he must have been less perfectly fitted to his previous mode of life, and as yet but ill adapted to even the lowest savage-life. In like manner, it is nearly impossible to conceive that he should have possessed intelligence sufficient to perceive the advantages ultimately to arise from assuming a more erect position; and unless he foresaw these advantages, and in fact deliberately decided on present self-denial for the sake of advantages to his posterity, we are forced to adopt some other explanation quite as unreasonable, chance or an innate power unconsciously evincing superior intelligence. Mr. Darwin, perhaps from long experience, seems able to conjure up a personal principle under the term, "Nature," which is

assumed to possess the power of controlling the affairs of the animal and vegetable kingdoms. This all-potent intelligence refuses, however, to come at the bidding of non-believers in evolution. Through what agency does unconscious nature operate in producing results which so powerfully remind us of a controlling intelligence? Has she chosen the "survival of the fittest"?—and is this an instrumentality so well adapted to the improvement of species as to leave upon our minds the settled conviction that nature, though supposed to be blind, can exhibit marvelous intelligence? Does the mere survival of the fittest insure improvement? We think not. The expression has been very adroitly chosen, for there naturally slips into it the assumption that the fittest to survive are an advance on their predecessors, whereas they may be the same, or may be more degenerate. That the fittest to survive are an improvement on their ancestors, has not been proved. In the severe struggle for existence, "more individuals being born than can possibly survive," can the fittest do anything more than hold their own? Is it fair to assume that because the weakest perish, therefore the others are an improved type? A more legitimate inference would be that those which survive are degenerate. If the conditions of life are so severe that the majority of the individuals succumb, are they not so severe as to weaken those which survive? The Texan cattle-raiser, on hearing in the spring that the severity of the winter has caused the death of nine-tenths of his herd, does not conclude that the remaining one-tenth has been improved by the causes which destroyed the rest. If carefully housed and fed the ensuing year, they might possibly perpetuate a variety slightly more hardy—though this is somewhat doubtful, and if it did occur it certainly could not be legitimately said that

the "survival of the fittest" was the efficient cause; but if the remnant were left to the severe struggle for existence which is going on in nature, it is evident that their survival, far from carrying with it an implication of improvement, would merely justify us in concluding that the more weakened and the more degenerate, or the younger and the older, perished—the less weakened and the less degenerate survived. The causes which produce the survival of the fittest, evidently tend to produce general degeneration; they manifestly have no efficiency in causing improvement. It has not even been shown that the very best individuals which any species can produce are capable of self-improvement if left to the hard conditions of life to which they are exposed when not under domestication. They frequently degenerate. Has there been a sufficiently extensive generalization to justify the assertion that the tendency to improve, under such circumstances, is more potent and more universal than the tendency to deteriorate? Certainly it has not been proved that the less degenerate go on improving till a new species originates.

The preponderance of probability is evidently in favor of the assumption that the fittest to survive are themselves a degenerate class. Conditions of existence which destroy a majority of the individuals of a species must tend to weaken the survivors. If natural selection, under such circumstances, enables them to hold their own, it evidently does well. When summer droughts are so severe as to destroy three-fourths of all living vegetable organisms, the remaining one-fourth is not likely to be above the normal standard. Hence, that improvement is an attendant on the struggle for existence is a purely gratuitous assumption. There is natural selection, unquestionably; but it occurs under circum-

stances unfavorable to the production of improved varieties. The hard conditions do not terminate the moment natural selection has resulted.

"The stronger and the more vigorous survive." Yes: but the stronger and the more vigorous compared with what?—with the individuals which perish manifestly; but it is assumed that they are the stronger and the more vigorous compared with the normal condition of the species. This, however, has not been proved; and until that is done the inference that there will be an improvement in the species is an unwarrantable assumption, indeed, it is tantamount to saying that the harder the conditions of life the greater the improvement.

Another difficulty: How shall we account for the fact that from an indefinite number of variations, minute and ill-defined in all conceivable directions, and having a natural tendency to destroy one another, certain changes should become so well established as to remain permanent marks of a new species? Can it be proved that the advances of the gorilla-tribe, if advance has occurred, have proceeded to the extent of developing a new species, man? The chances are almost infinite in number against the appearance even in one pair of monkeys through numberless generations, of organs, faculties, senses, perceptions, and moral qualities, useless for the time being in the struggle for life and yet converging to the same point, the evolution of a human being. Add to this the fact that there are a thousand chances to one that if a new species is produced it will speedily revert to ancestral forms, that if slight increments of change acquire permanency, other closely allied species will be produced, and we are enabled to catch a glimpse of the improbability of this theory, an improbability

amounting almost to demonstration that no species of ape could have been man's progenitor.

Even supposing that all these fortuitous variations were improved types, still, some would improve more than others; hence it must result that this ascending series of necessity would have perpetuated branches of the simial family in advance of previous forms, thus producing a graduated series between man and his ape-like ancestors. No such gradation of beings exists, however, or has existed, so far as known. And if one species of the ape-family had actually advanced a few steps towards manhood, the powerful tendency to revert to the original type would, in all probability, have obliterated the slight improvements long ere the immense intervening distance was successfully traversed. The variations, all within narrow limits, which man has been able to produce in animals by the careful selection of individuals possessing transmissible qualities, are very speedily obliterated when care is relaxed, the old types reappearing.

Admitting that natural selection does tend to produce variation, and that it accumulates and preserves these slight increments of development; still, can it evolve higher species from lower? This, confessedly, has not been proved. It has been proved that rudimentary organs exist, that new varieties can be produced, but it has not been shown that advance is indefinite, nor that when it occurs it is not a regain of lost characters. Ducks, removed for several generations from water, are said to lose the web from between their toes: placed again for several successive generations near water they redevelop them. Does this prove advance? If a few pairs of monkeys, more ambitious than their neighbors, should acquire greater facility in the use of their fore-feet as hands, and should assume a more erect posture,

and under the operation of natural selection should be capable of preserving and transmitting these acquisitions, it would yet remain to prove that these changes were not a reversion. Even then the problem would not be solved, for it would still be necessary to show that the improvements actually continued till "the human form divine" was evolved from that of the ape, and then acquired such fixedness as neither to advance further for thirty thousand years, nor to revert in one single instance to the ancestral form.

If man is descended from some ape-like progenitor, it is difficult to see why his infant children should have become so helpless as to require years to attain strength and knowledge sufficient to take care of themselves. The human infant is the most helpless of creatures. Young monkeys are sprightly, active, and self-helpful.

It ought to be observed, moreover, that the gain of a few individuals is not a net gain to the species; and in nature, where "love" has its own way, what is to prevent such a pairing of individuals as shall effectually obliterate these slight improvements? Manifestly there is an almost absolute certainty that the advances made by the few will, in a state of nature, speedily disappear under the malign influence of the many. If there is any permanent advance, quite manifestly it must be the gradual improvement of the entire species, at least of all the individuals inhabiting an extended region; but how is this possible without leaving monuments along the lengthened pathway through which they must have journeyed?

If an improved variety of monkey was "evolved" from some pre-existing lower form, what prevented the individuals from becoming sterile *inter se*, the variety

thus disappearing entirely? It is an established fact that both in plants and animals improved varieties, that is, those which have acquired profitable characteristics bearing but slight resemblance to those of the species, tend to sterility. Precisely the reverse of this is what we should have expected if the differences between varieties really became augmented into the wider differences between species. Moreover, since two distinct species are almost invariably sterile when their members are united, it follows that the individuals of different varieties should be expected to grow mutually sterile, more and more so as they approached a new species; but the fact is diametrically opposite, varieties of the same species are mutually fertile, and more so than individuals of the same, and especially of an improved, variety. Again: closely allied species, as the horse and the ass, produce offspring which are either sterile or become so in one or two generations; which apparently ought to be otherwise if varieties and species are fundamentally the same, differing only in degree—indeed, hybrids ought to be more fertile, for the offspring of individuals of two different varieties commonly are. Nor is it possible to affirm that this tendency to sterility, either in hybrids or in the offspring of a variety which has been interbreeding too long, may result from the operation of natural selection, for it is inconsistent with the power ascribed to this agency, if not inconceivable, that natural selection should have accumulated and preserved increasingly advantageous increments of sterility—profitable additions of a negation. Therefore, before the mutation of species can be considered established four hard facts should be satisfactorily explained:—

1. Why do marked varieties tend to become sterile if new vigor is not imparted by crossing with individuals of

another variety under the same species? Darwin says, "It is a great law of nature that good should come from crossing." Why? Evolution can give no answer. The advocates of the immutability of species can reply, "The good would seem to come from the contribution to the offspring by each parent of some quality or qualities which the other lacks, or has only in small measure, which qualities are essential to the species under which the varieties occur."* In confirmation of this he is able to call attention to the fact that the good is in exact proportion to the amount of positive structural differences in the crossed parents; and that when a variety has all the positive features of its species no advantage results from crossing with another variety. Evolution ought to assign some reason why crossing is so advantageous. It ought also to explain how this tendency to sterility is acquired. It ought to show how an improved variety of the monkey-tribe could pass the immense distance which intervenes between the simial family and the human, without becoming extinct, the individuals growing sterile.

2. Why are distinct species invariably sterile *inter se*? If good comes from the crossing of varieties, an actual remedy being thereby furnished for the evils resulting from close interbreeding, and if species are simply varieties further removed, it is remarkable that species when

* Darwin says, "I have collected so large a body of facts, showing on the one hand that an occasional cross with a distinct individual or variety increases the vigor and fertility of the offspring, and on the other hand that very close interbreeding lessens their vigor and fertility, that I must admit the correctness of this almost universal belief among breeders."—*Origin of Species*, p. 235.

"Both with plants and animals, there is abundant evidence that a cross between individuals of the same species, which differ to a certain extent, gives vigor and fertility to the offspring: and that close interbreeding continued during several generations between the nearest relatives, especially if these be kept under the same condition of life, almost always induces weakness and sterility."—*Origin of Species*, p. 252.

crossed are not fertile. "The view generally entertained by naturalists," says Darwin, "is that species, when inter-crossed, have been specially endowed with sterility, in order to prevent their confusion. This view certainly seems at first highly probable, for species within the same country could hardly have been kept distinct had they been capable of freely crossing."—*Origin of Species*, p. 233. The barriers of species seem fixed with a measure of rigidity which effectually prevents individuals from propagating either monstrosities or new orders of beings.* Individuals of two remote species of the monkey family could not have been the parents of man's ancestors.

3. Why are hybrids, or the offspring of allied species, sterile, or nearly so? Darwin says, "I doubt whether any case of a perfectly fertile hybrid animal can be considered as thoroughly well authenticated."—*Origin of Species*, p. 238. Again: "Hybrids from two species [of plants] which are very difficult to cross, and which rarely produce any offspring, are generally very sterile."—*Idem*, p. 241. Once more: "A multitude of cases could be given of very closely allied species which will not unite, or only with extreme difficulty."—*Idem*, p. 241.

How then could individuals of two closely related monkey species become the progenitors of a hybrid progeny which ultimately evolved the human species, which retains fertility after thousands of generations?

* "According to this [Darwin's] view of the origin of many domestic animals, we must either give up the belief of the almost universal sterility of distinct species of animals when crossed, or we must look at sterility, not as an indelible characteristic, but as one capable of being removed by domestication."

His conclusion is in these words: "Finally, considering all the ascertained facts on the intercrossing of plants and animals, it may be concluded that some degree of sterility, both in first crosses and in hybrids, is an extremely general result; but that it cannot, under our present state of knowledge, be considered as absolutely universal."—*Origin of Species*, p. 239-240.

Darwin, it is true makes light of the sterility of hybrids. This he might have done with propriety if sterility had characterized the crossing of varieties, instead of the interbreeding of individuals of an improved variety; if increase of fertility had marked the interbreeding of individuals of an improved variety, instead of the crossing of different varieties belonging to the same species.

To blunt the force of the argument from sterility, Darwin has invented two hypotheses; (*a*) Individuals of the same species are susceptible of all degrees of lessened fertility—therefore, sterility is not a special endowment to prevent the transmutation of species; (*b*) Sterility between different species may have been induced by modifications slowly impressed by unknown causes on the reproductive systems of parent-forms—nothing stands in the way of crossing species successfully except the want of adaptation in genital organs and in the reproductive elements.*

4. What causes could have produced sterility? If a species differs from a variety merely in being a more permanent aggregate of characteristics slowly acquired through nearly interminable periods, and if, consequently,

* "We see that when forms, which must be considered as good and distinct species, are united, their fertility graduates from zero to perfect fertility." —*Origin of Species*, p. 243.

"The foregoing rules and facts . . . appear to me clearly to indicate that the sterility both of first crosses and of hybrids is simply incidental or dependent on unknown differences in their reproductive systems. . . . And as we must look at the curious and complex laws governing the facility with which trees can be grafted on each other as incidental on unknown differences in their vegetative systems, so I believe that the still more complex laws governing the facility of first crosses are incidental on unknown differences in their reproductive systems. . . . The facts by no means seem to me to indicate that the greater or less difficulty of either grafting or crossing various species has been a special endowment; although in the case of crossing, the difficulty is as important for the endurance and stability of specific forms, as in the case of grafting it is unimportant for their welfare." —*Origin of Species*, p. 245-246.

sterility is not a special endowment, how could it have originated—to say nothing of the difficulty of explaining why it should be operative where according to the theory it should have been inoperative, and inoperative where it should have been operative?

Darwin concedes that natural selection could not have produced sterility;* that no advantages could come to separated species by being rendered mutually sterile, but that it would profit an incipient species if it were rendered in some slight degree sterile when crossed with its parent-form, or with some other variety; for thus fewer bastardized and deteriorated offspring would be produced to commingle their blood with the new species in process of formation; that the facts connected with reciprocal crosses are directly in the way of accepting natural selection as an agency in the production of sterility. Forced to acknowledge that his pet theory furnishes no explanation of the facts connected with sterility, he takes refuge in his oft-repeated proposition that sterility is incidental on unknown differences in the reproductive systems of the parent-species.—*Origin of Species*, p. 248-249.

It was once thought that the sterility of hybrids might possibly be caused by the commingling of two different constitutions into one, disturbances occurring in the subsequent development. This is now abandoned, it having been ascertained that sterility affects

* "The sterility of species when first crossed, and that of their hybrid offspring, cannot have been acquired by the continued preservation of successive, profitable degrees of sterility."—*Origin of Species*, p. 233.

"After mature reflection it seems to me that this could not have been effected through natural selection."—*Idem*, p. 247.

"I infer, as far as animals are concerned, that the various degrees of lessened fertility which occur with species when crossed cannot have been slowly accumulated by means of natural selection."—*Idem*, p. 247.

the offspring of dimorphic and trimorphic forms, as in plants which present two and three forms which differ in no respect except in their reproductive systems. Why are these, whose organisms are precisely the same, infertile *inter se*, when the pollen of the one is artificially communicated to the stigmas of the other, the difficulties connected with their reproductive systems being thereby obviated ? Lo, they are as sterile as two distinct species.

If in the vegetable world there had been no sterility between separated species, it seems evident that there must have been confusion inexplicable. If the stigmas of each flower and each blossom could have been fertilized by the pollen of any plant, it would have been impossible to determine what kind of fruit any particular tree would bear. A garden in which there were fruit trees—peach, apple, cherry, and plum; small-fruit—strawberries, raspberries, blackberries, etc.; vegetables—peas, beans, potatoes; flowers—roses, fusias, pinks, etc., what would be its products in the autumn ? Who could tell what pollen would fertilize each blossom ?

Another powerful reason for rejecting this theory is the absence of transitional forms. As we are not asked to believe that the ape-like creature, to which man is said to owe his origin, was the immediate offspring of the simiadæ, but that there were numberless insensible gradations, it is certainly strange that no connecting links have been discovered, either among the living or the fossil dead. According to evolutionists, apes ranged over the continent of Europe as far back as the upper miocene period; and yet, what they are now they were then, there being no remains of improved forms. Still, we are expected to believe that the gorilla went on improving for thousands upon thousands of years till at

length man was born, and then forsooth the improved species died out, and all the intermediate forms disappeared, leaving only the silly monkey and his disowned children, the human family, all record of the intimate relationship between them having been effectually obliterated. Assuredly, we may count on being excused for expressing the regret that at least one fossil hand, or skull, or thigh-bone, or pelvis, belonging to a transitional form, was not preserved; but no, we have simply gorilla's bones and man's bones, no bones from intermediate links.

Great as is the improbability that there should be no record of the transition from the ape to man, the improbability is greater that all species should have varied during the long geological periods without leaving one single fossil of a transitional form, not even in situations and under conditions where almost everything seems to have been preserved. Why is there such a number of perfectly similar specimens of so many species of plants and animals, and no graduated links; and yet, in order to the gradual development of species, the number of variations must have been far greater than the number of individuals in any one variety? It seems therefore more probable that no two specimens preserved would be of the same variety, than that numberless specimens of one variety should be found and absolutely none of the connecting varieties. It is almost inconceivable that no record should be preserved of all the incipient stages in the development of new organs; and yet, though thirty thousand specimens of extinct animals have been collected, not one has been proved to be a transitional form, but is considered as belonging to an independent species, the few once claimed as intermediate forms having been proved to be distinct.

This objection, it has been said, though of force against evolution in general, has no force against the Darwinian hypothesis, since the absence of transitions is a consequence of his doctrine, the stock whence new species spring not being necessarily intermediate between two pre-existing species, as is evident from the fact that the carrier-pigeon and the fan-tail came from the rock-pigeon without any intermediate links. If there is any cogency in this argument, it is singular that Darwin did not observe 't; and if his pupils are to employ it, it is unfortunate that their teacher so frequently laid stress upon the aphorism, "Natura non facit saltum." If nature makes no jumps there certainly ought to be transitional forms.

Sir Charles Lyell (who after long resistance has become an advocate of evolution and as well of the savage theory of man's origin) undertakes, in his *Antiquity of Man*, to blunt the edge of this adverse criticism by reminding his readers that search for the missing links between man and apes has not yet been made upon the proper pages of nature's great book. They must be sought, he says, not in miocene or eocene strata, but in pliocene and pleistocene and in equatorial regions. In these latter formations, and in the continents of Africa and Asia, investigation must be made. But he elsewhere affirms that in very remote periods Europe enjoyed a tropical climate and was inhabited by gibbons and long-armed apes and monkeys in large numbers. Why conclude that the transmutation must have taken place in regions as yet but imperfectly explored?

The links in the evolutionist's argument are thus found to be the weakest just where they should have been the strongest. Darwin admits that he should have expected more evidence from geology. The only explanation he can give is to insist upon the imperfection of the

geological record—a poor solution, as all must acknowledge. He even concedes that all the most eminent geologists, reasoning from this absence of intermediate forms, believe in the immutability of species. He believes, however, in the mutability of species; and yet, if varieties differ from species only in degree, the successive steps ought to have been chronicled in the rocks by a connected series of slightly improved individuals; if indeed, instead of a record of the existence of distinct species, there ought not to have been clear traces of utter confusion in nature. It is true that fossils from successive formations are more closely related to each other than the fossils of two remote formations; it is also true that the tendency in recent geological researches is to adopt the theory that there has been no sudden and extensive changes; but there are gaps, nevertheless, as few presume to deny.

Though it is now generally conceded that the transformations which have taken place were seldom, perhaps never, sudden, complete, and simultaneous; still, evidence is not wanting that they were in fact new creations. For example, the silurian rocks contain fossils in abundance, but there are no fishes and no forms giving evidence of the capability, or even possibility, of developing fish. In the next epoch, lo, fishes are found in vast numbers, and even in perfect types. If there was an almost infinite number of gradations between mollusks and fish, why are there no deposits containing testimony to this fact? Why is the proof so strong that there have been successive creations?

Why do the changes, which in many instances are not slight, bear evidence of having been produced by a power outside or above the ordinary course of nature? "The evidence of geology to-day," says an eminent naturalist,

"is that species seem to come in suddenly and in full perfection, remain substantially unchanged during the term of their existence, and pass away in full perfection, other species take their place, apparently by substitution, not by transmutation."

CHAPTER IV.

MAN'S INTELLECTUAL NATURE.

IT is more particularly as it relates to the origin of man's moral, intellectual, and religious nature, that the christian has to do with the theory of evolution. The idea of a relationship between man and the lower animals is conceivable, as far as the mere animal frame is concerned. Confessedly, there are many close resemblances in anatomical structure; indeed, there is nearly absolute identity, bone for bone, muscle for muscle—some muscles occurring in man which are of no use, though of use in apes. Similar organs perform like functions. The apes, as well as man, love and hate, perceive and feel, remember and imagine, will and reason, have definite ideas and the means of communicating them. Professor Agassiz attributes to animals "an immaterial principle similar to that which, by its excellence and superior endowments, places man above animals." When we are asked to believe, however, that our mental faculties, which are capable of such improvement, have been evolved from those of the simiadæ, too heavy a tax is laid upon our credulity. Most persons, even those who do not believe in the christian religion, are disposed to accept the account given in the Bible, one of the crowning glories of which is that it recognizes, in all its fullness, the essential dignity of the human family. It presents God as the Author of our being, and the Preserver of our existence, our Strength

in the struggle with sin, our Comfort in sorrow, and our Hope in death.

We should err were we to confine this ennobling conception of the Fatherhood of God to those who possess His revealed Will. It has found a place in many systems of faith. Elsewhere than under the influence of Hebrew forms of philosophy, even in nations less cultured than the Greeks and less intellectual than the Romans, has the peasant boasted of a divine parentage. To others, as well as to the Athenians, Paul might have said, "As certain also of your own poets have said, 'For we are his offspring.'"

A theory of man's origin therefore which is honorable and ennobling, and which comes to us sacred with years and consecrated by the faith of generations, may be expected to be so entrenched within our affections that powerful arguments will be needed to shake the conviction that we are made in God's image—our intellectual faculties being a copy, faint though real, of God's unclouded intelligence—our moral nature a transcript, dim indeed but genuine, of God's approbation of right and His condemnation of wrong. It would seem as though the unbiased investigator must accept the affirmation of M. Quatrefagas, as given in his work on the *Unity of the Human Species*: "Man must form a kingdom by himself if once we permit his moral and intellectual endowments to have their due weight in classification."

Does the theory in question possess arguments sufficiently potent to counteract these predilections? Does it satisfactorily account for man's higher nature? It is conceded that here the theory is weak. Professor Huxley himself admits that the difference between man and the lower animals amounts to an "enormous gulf," to "a divergence immeasurable—practically infinite." Those

therefore who are inclined to believe that the theory of evolution may be so stated as to contain nothing necessarily antagonistic to Revelation will be disposed to limit it to man's physical nature, maintaining that in other respects at least he was not only made in God's image, but was created without the intervention of natural causes: and since the possibility of the mutation of species is as yet unestablished, and man's descent even in his bodily organism from the monkey rests on inconclusive testimony, most persons will also deem it unnecessary to assume two origins, one for the lower, the other for the higher nature.

Unless God is our Creator how shall we account for that subtle force we denominate mind? To say nothing of the difficulty of accounting for the origin of the mind of brutes—of perceiving how intellectuality can be evolved from matter—how shall we be put in possession of evidence sufficient to induce the belief that "the human mind has gradually developed in the course of millions of years from the mind of the lower-skulled animals"? How is it possible to believe that from sources so inadequate those faculties could have been evolved which have compelled nature to unlock her storehouses, affording clothing of every variety and food in abundance; faculties, which have devised means of protection against beasts whose fleetness, strength, and agility surpass those of man, thus giving the weak an easy dominion over the strong; which have made nature man's servant, controlling her actions or bringing his into harmony with hers? Improvable reason is man's peculiar and exclusive endowment.

The dominion of mind over matter, however, marvelous as it is, is not the strongest proof of man's supernatural origin. The wonderful creations of the human intellect, in musical harmony, in poetry, in painting, in sculpture,

in architecture; its marvelous powers, of induction, analysis, synthesis, generalization; its ability to form abstract ideas—space, goodness, sin, immensity, truth, honor, eternity, the absolute and the unconditioned,—infinite conceptions struggling for expression in human language,—these testify to the existence of faculties which it is almost impossible to conceive could have been developed from lower animals. In like manner, the capability of receiving pleasure from mathematical demonstrations—in fact the ability to prosecute them—and the perception of cogency and beauty in an argument felicitously expressed, certainly afford evidence of an immense chasm between man and the most gifted of the inferior animals. This “immeasurable divergence” becomes even more apparent as we contemplate the achievements of the astronomer, who, in his study of the systems of worlds which move through the unheralded pathways of a universe, has ascertained facts and established laws which reason seems to say must forever have remained beyond the grasp of a being whose mind was evolved from “the medullary tube of the lancelet.” To measure the distances, to estimate the size, and to determine the movements of bodies so far distant as to appear mere specks in the depths of immensity is quite manifestly a task too great for any brain that could have been developed from that of the lowest vertebrate. As in imagination we place ourselves at the center of the solar system, seeing the planets as they move in their noiseless pathways; as in fancy we station ourselves at Alcyone, the apparent center of our nebulous system, ascertaining the length of time required for its revolution and learning that it burns with a brilliancy twelve thousand times greater than that of our sun, it will require a logic trenchant indeed to convince us that man owes his origin to anything less than

the direct volition of an Infinite Intelligence. Wondering at the conquests of the human intellect we instinctively exclaim, "It is the handiwork of God."

The mind of man is capable of yet greater triumphs. With the assistance of the largest telescope—itself a marvel of mechanical and scientific genius—the beholder can number, it is said, eighty million suns; some of which are so far distant that the light which they reflect requires more than a million years to reach the eye; nay, burning specks have been resolved into suns, each shining with splendor equaling that of our sun. Furnished with a knowledge of the higher mathematics, it is even possible to measure their distances from each other, their distance from the earth, and their periods of revolution. As we concentrate our thoughts upon these and similar displays of mental power the overawed soul asks with the emphasis of a well-founded faith, Can man be less than the direct creation of an Omniscient Intellect? Most persons would no doubt concur in the opinion that it requires no small measure of credulity to believe that the "survival of the fittest" of monkeys could have evolved an intellect capable of such mental processes, even though the survival should have been uninterruptedly carried on during four hundred millions of years; that the intellect of him who has weighed the stars and compelled the lightning to transmit his thoughts has been developed from that of the silly brute which wanders in the forests of tropical countries and obtains a precarious subsistence by feeding upon the uncultivated products of the soil; that because man's framework approaches that of the ape-family, therefore his intellectual faculties are the same in kind, differing only in degree. Assuredly it is easier to believe the declarations, "God made man in his own image;" "The Lord formed man of the dust of the

ground and breathed into his nostrils the breath of life; and man became a living soul."

Having called attention to the greatness of the human intellect as evinced in the achievements of astronomy, it may not be inappropriate to note evidences of its existence where, according to evolutionists, we ought least to expect it, in the language of the Hottentots. We are informed on the authority of Mr. E. Norris, that though remarkably simple, their language is yet comprehensive and expressive. The nouns have two genders, distinguished by termination. There are four numbers, singular, plural, and two duals, one appropriated to a pair, the other to two individuals. Not merely is the nominative case clearly distinguished from the accusative, but there is a copious declension. Its numerous pronouns, all completely and regularly declined, have "distinct forms for every conceivable modification of meaning," the second person distinguishing the gender and the first person plural having two forms, one including, the other excluding, the person addressed in the "we." The verbs are conjugated by the addition of syllables. Even conjunctions, which are supposed to characterize highly cultured languages, are quite numerous. Assuredly, on the theory of evolution, it seems remarkably strange that even the lowest savages should evince so great intelligence.

Facts such as these come in strong conflict with the assertion of Haeckel, "All philologists who have made any progress in their science now unanimously agree that all human languages have developed slowly and by degrees from the simplest rudiments. The natural evolution of language is necessarily evident to the student of nature. For speech is a physiological function of the human organism, developing simultaneously from its special organs.

the larynx and the tongue, and simultaneously with the functions of the brain."

When once the conviction has forced itself upon us that man's intellectual faculties must be the immediate creation of a Supreme Being, we are disposed to concede that his physical organism most probably had the same origin, since there is a correlation between the two. Man is not a duality, but a unity, all his organs being adapted to the purposes for which the mind employs them. If there are reasoning faculties, so also there is a corresponding cranial development. If there exists the ability to invent new machinery, there is also a skillful hand to execute the mechanical part of the work. If there is the capability of receiving correct impressions of external objects, and reasoning in reference to their relations, there are also organs and senses adapted to convey accurate representations of these objects. Suppose that by some inexplicable fortuity the mind of Sir Isaac Newton had been given to a gorilla, could that fortunate, or rather unfortunate, specimen of the simial family have been the renowned philosopher? The very supposition is its own refutation, and for this simple reason, that the gorilla would have been destitute of the organs correlated to a mind so different from that of his ancestors. Its clumsy hand and unwieldy arm are indeed correlated to a brain whose servants they are, and are adapted to the uses for which they are needed; but no amount of brain-power could wield them in penning the *Principia*. Its brain of twenty-nine and one-fourth cubic inches (the average gorilla brain), or thirty-five cubic inches (the largest gorilla's brain yet measured), bears an inseparable relation to the mind that employs it, but would very poorly answer the purposes of a mind that employed a brain of one hundred and fourteen cubic inches. In like manner,

the nervous system of the ape no doubt answers the ends for which it was given, but it does not follow that it would be equal to the demands of a philosopher. So also the tongue, the lips, and the larynx of the simiadæ are correlated with the functions they are to discharge, but are unfitted to pronounce articulate sounds expressive of definite ideas. As Professor Max Müller has aptly remarked, "There is between the whole animal kingdom on the one side, and man, even in the lowest state, on the other, a barrier which no animal has ever crossed, and that barrier is language." Again: "Show me an animal that can think and say 'Two,' and I should say that as far as language is concerned, we cannot oppose Mr. Darwin's argument."

Nor is it pertinent to answer, This argument merely proves that mind must be the result of progressive development as well as the physical organism is, the two maintaining intimate and mutually helpful relations: for, aside from the fact that anatomists have resolutely maintained that in an anatomical point of view the transmutation of the ape into man is an impossibility, and aside from the difficulty of evolving man's mental and moral faculties from the simial family, an additional and very serious element of difficulty is introduced, namely, that the mental and physical improvement of the gorilla should go forwards simultaneously, maintaining an accurate correlation during all the stages. Shall the budding of a new faculty, if indeed that is possible, first suggest the propriety of developing a new organ, or shall the incipient stages of a new organ invite the mind to prepare for expansion?—expansion in what direction? Or must the dawning of the two be strictly synchronous? In this case, whence comes the suggestive impulse? Surely we seem driven to admit the assertion of those

evolutionists who affirm that progress is "by insensible gradations produced by a fortuitous concurrence of circumstances"—a wordy explanation which explains nothing.

Intelligence and instinct, it has been said, stand in inverse ratio to each other. Some, accordingly, have maintained that the higher animals have gradually evolved intellectual faculties from their instincts. But no such inverse ratio exists. Those animals have the most instinct which are the most intelligent, as the beaver, the dog, etc. This would seem to stand in the way of the assumption that instinct may be transformed into intellect, unless transformation can proceed without lessening that which is transformed until the transformation becomes nearly or quite complete, when suddenly intellect almost entirely displaces instinct. If, as is conceded, instinct becomes more powerful in animals in exact proportion as they become more intelligent, how, if man's intellect came from the lower animals, does instinct happen to be feeble in man though intellect is powerful? It is difficult, as all know, to draw a line of demarkation between instinct and reason; but there certainly is no evidence that the former develops into the latter.

Herbert Spencer thinks the dawning of intelligence were developed "through the multiplication and co-ordination of reflex actions." This mysterious agency has been acting, however, upon baboons for unnumbered centuries under the eye of man. Have they made any perceptible progress in ability to reason? Have they attained that degree of intellectual development which enables them to understand what Spencer means by this all-potent law through whose operation their more honored relatives became, in ancient times—about four hundred million

years ago--the anthropomorphous ancestors of *homo sapiens*? Darwin says:

"These [the intellectual] faculties are variable; and we have every reason to believe that the variations tend to be inherited. Therefore, if they were formerly of high importance to primeval man and to his ape-like progenitors, they would have been perfected or advanced through natural selection. . . . It is, therefore, highly probable that with mankind the intellectual faculties have been gradually perfected through natural selection. . . . It deserves notice that as soon as the progenitors of man became social (and this probably occurred at a very early period), the advancement of the intellectual faculties will have been aided and modified in an important manner, of which we see only traces in the lower animals, namely, through the principle of imitation, together with reason and experience. Apes are much given to imitation, as are the lowest savages."

In his lengthy and interesting discussion of the subject, this last mentioned author undertakes to point out resemblances in structure between man and apes, similar processes of development, like functions of organic members, and even the possession by lower animals of the rudiments of almost every human faculty—sympathy, conscience, reason, will, memory, imagination, the sense of beauty as exhibited in the Bower bird, etc. The argument, shorn of its irrelevant though interesting facts, rests on the following syllogism:—1. Man's physical organism was probably developed from the lower animals, since they have correspondences; 2. His mental powers may possibly have been evolved from the germs which seem to exist in inferior animals, as in the ape-family; 3. The two, as is necessary, may have been concurrently developed; Therefore:

"Man is descended from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits, and an inhabitant of the Old World. This creature, if its whole structure had been examined by a naturalist, would have been classed among the quadrupeds, as surely as would the common and still more ancient progenitor of the Old and New World monkeys. The quadrupeds and all the higher mammals are probably derived from an ancient marsupial animal, and this through a long line of diversified forms, either from some reptile-like or some amphibian-like creature, and this again from

some fish-like animal. In the dim obscurity of the past we can see that the early progenitor of all the vertebrata must have been an aquatic animal, provided with brachiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed." * "At the period and place, whenever and wherever it may have been, when man first lost his hairy covering, he probably inhabited a hot country and this would have been favorable for a frugiferous diet, on which, judging from analogy, he subsisted. We are far from knowing how long ago it was when man first diverged from the catarhine stock; but this may have occurred at an epoch as remote as the eocene period; for the higher apes had diverged from the lower apes as early as the upper miocene period." † "It is somewhat more probable that our early progenitors lived on the African continent than elsewhere." ‡ "The simiadæ branched off into two great stems, the New World and the Old World monkeys; and from the latter, at a remote period, man, the wonder and glory of the universe, proceeded." §.

The above "summary" would probably be considered by most reasoners as a large yield of "conclusion" from a small outlay of premises (albeit, the discussion is sufficiently extended).

For fear we may be charged with doing injustice to this eminent author, we append a few of the interesting resemblances pointed out by him as existing between man and apes—similarity in the relative positions of the features, similar movements of the muscles and skin in the display of emotions, resemblance in the external ears and nose, the possession of beards, the abundance of hair on the head, nakedness of the forehead, the presence of eye-brows, the arrangement of the hair on the arms in converging lines towards the elbow, the same senses and intuitions, the same emotions and faculties which though varying in degree are the same in kind, capability of improvement, etc. Though it would be unfair to leave the impression that Darwin considers these and similar resemblances necessarily the result of unbroken inheritance, and equally unfair to assume that he rests his

* *Descent of Man*, vol. ii. p. 372.

† *Idem*, vol. i. p. 192.

‡ *Idem*, vol. i. p. 191.

§ *Idem*, vol. i. p. 204.

argument mainly on these, it nevertheless cannot be denied that he lays great stress on slight analogies—much greater, apparently, than is warrantable. Such resemblances neither justify us in charging the Deity with want of originality, nor in inferring that those organisms in which they occur must stand related to each other as progenitor and offspring, or must have descended from a common ancestry. It is extremely difficult to conceive that there should have been an entire absence of resemblances between man and the lower animals, if he was to possess a physical nature: apparently there was no necessity for entire dissimilarity; nay, the very similarity of organs in two beings, which are nevertheless separated from each other by an “almost infinite divergence,” tends rather to heighten the conviction that at least the faculties of the higher, if not those of the lower, must be the direct creation of Divine Intelligence.

In contrast with this theory—which is in fact but an hypothesis searching for facts upon which to rest—how honorable is the Scriptural account of the origin of the human family. Man's existence is due to divine power, his continuance in being to Him who upholds systems, worlds, suns, myriads of forces; to Him who cares for the minutest insect that flutters away its brief life in the morning sunbeam; who, to tiny creatures, has given not only limbs, mouths, digestive organs—all the parts requisite to success in the struggle for food—but has given an eye so perfect, though no larger than the point of a needle, as to be capable of producing forty thousand images of the face of the beholder. “Marvelous are thy works, O Lord.” In the list of wonders infinite, stand these the foremost: “God created man:” “He prevents him from sinking back into annihilation.”

If man is an evolution from the anthropoid apes, at

what point in his gradual, and almost infinitely protracted improvement, did he become possessed of immortality? —or are we to conclude that he perishes? At what point did he become distinguishable as man, beastiality giving place to humanity?

CHAPTER V.

MAN'S MORAL NATURE.

WIDE as is the divergence in intellectual faculties between man and the lower animals, in moral nature the chasm is still broader. It is not merely a difference in degree, but in kind, animals being entirely destitute of moral qualities properly so called. True, they possess social instincts, and in the exercise of these occasionally manifest qualities resembling those which in the human family are denominated ethical. The horse, which carries forward a process akin to reasoning, and remembers places which it has frequently visited, seems also to have a measure of affection for its companion, and even for its owner. The elephant, which may be teased into a frenzy of rage, is also capable of appreciating kind treatment, and possibly feels an impulse slightly akin to gratitude. The lioness, fierce as her nature is, has affection for her whelps. A monkey has been known to come to the rescue of its keeper when he was attacked by an enraged baboon, thereby seeming to manifest a disposition to requite remembered kindnesses. Cattle, though sometimes far from manifesting sympathy with each others' sufferings—as when the wounded are driven from the herd—have nevertheless been seen to stand gazing on a dying or dead companion. The queen-bee, though she kills her fertile daughters, evidently has sympathy with all the members of her well-regulated household.

It is no unusual thing to see birds expressing extravagant joy over the nest which contains their happy young; some even build houses which are designed and exclusively used for social pleasures. Insects, as well as puppies and lambs, sport and wrestle and enter with zest into amusements, sympathizing with the joys of others. Crows have been known to feed a blind companion, thereby giving evidence of possessing the rudiments of what man regards as the highest virtue, unselfish care for the aged and the helpless. The baboons of Abyssinia, before setting out to plunder a garden, choose a leader and enjoin obedience to orders on the members of the company; if any one on the journey makes a noise, so endangering success, his nearest companion gives him a slap to remind him of the impropriety of disobeying orders.

Not only do animals appear to possess, though in but slight measure, love, gratitude, sympathy, obedience—qualities usually considered as possessing moral bearings—but also manifest courage, and in some circumstances the spirit of self-sacrifice. The bear, with intelligence adequate to the procurement of food for her cubs, will also rush between them and danger. When a troop of monkeys is attacked by dogs, the males will hasten to the front, showing valor and a readiness to sacrifice themselves for the good of the company: so successfully can they cover the retreat that even the youngest and the feeblest commonly reach the mountains in safety; there they receive the praise which gratitude prompts the rescued to bestow.

Perhaps the nearest approach made by the inferior animals to what we denominate conscience is the apparent sense of shame, bordering on remorse, which the whipped cur seems to experience as he cringingly supplicates a return of his master's favor. Professor

Agassiz thinks that dogs possess a faculty closely akin to conscience.

Without questioning the truth of these and similar facts, we do not hesitate to affirm that there is in the lower animals no quality and no combination of qualities, from which the sense of right and wrong, as it exists among men, could have been evolved. In this affirmation we are sustained by the facts of the case and by the testimony of naturalists well qualified to express an opinion. Mr. George Mivart, though an ardent advocate of progressive development (not, however, of natural selection, nor of the derivation of man's mental and moral faculties from the lower animals), boldly asserts: "There is no trace in brutes of any action simulating morality which is not explicable by fear of punishment, by the hope of pleasure, or by personal affection." *

Those evolutionists who pursue their theory to the extent of developing man's higher faculties from the simiadæ hold that though the moral sense constitutes the most important difference between man and the lower animals, still, even here, the difference is one of degree and not of kind; that though there is a wide divergence between the two conceptions, "the expedient" and "the morally obligatory," they are nevertheless the same in origin; that those apes which possessed an instinctive liking for practices useful to the community, have, through natural selection, perpetuated a more numerous offspring than those possessing tendencies in an opposite direction; that the liking ultimately became "innate," and in man has gone on improving, though moral sense is feeble in savages, till it has culminated in the dictum, "Fiat justitia, ruat cœlum."

The advocates of this theory have different methods

* *The Genesis of Species*, p. 211.

of designating the bond that unites moral sense, as existent in man, with the germs thereof as they exist in inferior animals. Some maintain that it has had its origin in the principle of selfishness. This Darwin pronounces absurd (*Descent of Man*, vol. i. p. 94), and affirms that "the moral sense is fundamentally identical with the social instincts," which "have certainly been developed for the general good of the community." "Thus any animal whatever (*Descent of Man*, vol. i. p. 68.), endowed with well-marked social instincts, would inevitably acquire a moral sense or conscience, as soon as its intellectual powers had become as well developed, or nearly as well developed, as in man." Again: "The first foundation or origin of moral sense lies in the social instincts, including sympathy. . . . The social instincts would give the impulse to act for the good of the community." Mr. Herbert Spencer evolves conscience from the principle of utility, as existent in inferior animals. He declares, "There have been, and still are, developing in the race, certain fundamental intuitions, and, though these moral intuitions are the result of accumulated experiences of utility gradually organized and inherited, they have come to be quite independent of conscious experience." Others evolve it from the regard manifested by animals, to the highest happiness of the largest number. In the opinion of Sir John Lubbock, the author of *Prehistoric Times*, the moral sense has its origin in "deference to authority." This, on examination turns out to be simple utilitarianism; since, unless there is such a thing as absolute morality (which he denies), obedience must be produced either by the hope of reward, or the fear of punishment, or the mere pleasure arising from obeying—the motive must be utility.

It thus becomes evident that conscience, if developed

from the social instincts of inferior animals, must be regarded as having its genesis in selfishness, in the desire to secure the greatest good to the community, or in a regard to the highest happiness of the largest number, no other sources of moral principle existing in animals—if indeed these exist and are possible sources of moral intuitions.

As already intimated, the advocates of this theory admit that it is difficult to account for the moral element in man; that this, which Darwin designates “the most noble of all the attributes of man,” causes him to differ most profoundly from the simial family. He says:

“A moral being is one who is capable of comparing his past and future actions or motives, and of approving or disapproving of them. We have no reason to suppose that any of the lower animals have this capacity. . . . In the case of man, who alone can with certainty be ranked as a moral being, actions of a certain class are called moral, whether performed deliberately after a struggle with opposing motives, or from the effects of slowly-gained habit, or impulsively through instinct.”—*Descent of Man*, vol. i. p. 85.

Surely, then, we are justified in affirming that it will require a large induction of facts, larger than has yet been made, to establish the proposition that animals possessing social instincts inevitably acquire a moral sense, when there is a corresponding development of the reasoning faculties.

We are ready to concede that there may be adduced from the animal kingdom examples of acts simulating morality, as the care taken of the young, the feeling of love between members of the same fraternity, the posting of sentinels to guard against the approach of danger, hunting in company, obedience to the commands of leaders, etc. But acts which are merely conducive to the good of the community are not necessarily moral; indeed they may be positively immoral, and instead of tending to quicken the sense of right and wrong, may tend to

blunt it. By a community of thieves, who secure their booty not infrequently through murder, indifference to the sufferings of the helpless may come to be considered advantageous. If, as we are told, cruelty is characteristic of savages, who are declared to be an intermediate link between the ape-family and the human, how are we to account for man's intense sympathy with suffering? How explain his care of the weak, the mentally imbecile, the aged, and the worse than useless? Certainly it is not beneficial to society, and never has been, that the feeblest members should impose burdens upon the strong, and even leave enfeebled children as a legacy of woe to posterity. What then could have been the origin of man's noblest charities? How does it happen that his tenderest emotions prompt to self-sacrifice in the erection of hospitals, and insane asylums, and inebriate homes, and Magdalen retreats. How has kindness towards animals, even towards those which are useless to man, ever come to be regarded as a virtue? It is conceded by Mr. Darwin that a high standard of morality gives no advantage to individuals (*Descent of Man*, vol. i. p. 159); and when, as in these cases, it is clearly detrimental to the welfare of society, how could it have become established?

Is the difference one of degree and not of kind? We are conducted through a labored argument the design of which is to prove that the more enduring instincts conquer the less permanent. Birds, yielding to the more powerful impulse, migrate when the season arrives, leaving their helpless young in the nest. Who, it is asked, can say that the joys of their new home in the south are not clouded, in measure at least, by the remembrance of their deserted young in the chilly north? It is conjectured that they may suffer from remorse, deeply regretting their weakness in yielding to what for the time was

a more potent desire. To civilized men, "duty" is indeed the most powerful word in the language; but why may we not say that the hound "ought" to hunt without any regard whatever to present or prospective advantages?

We are thus given to understand that conscience, in its highest functions, when it acts regardless of self-interest, is to be viewed as but the exercise of an inherited habit. The retriever "ought" to bring his game and lay it at his master's feet, because he "ought" to obey an impulse transmitted from his ancestors. Man ought to do right even though it may not conduce to personal advantage, for he has inherited a habit which was laboriously evolved from the social instincts of the lower animals.

In answer to this specious theory we may very properly ask, Are the acts to which conscience prompts always instinctive?—has the moral sense no more enduring foundation than an inherited habit?—does it not testify to the existence of an eternal law of right and wrong?—do not its mandates come to us bearing the seal of a just God?—is remorse nothing more than the transient pain which results from disregarding the promptings of inherited habit?—this anguish, which poets have depicted in such vivid colors, and from which the guilty seek to escape, is it nothing more than an unpleasant sensation arising from the perception that one instinctive impulse has been yielded to rather than another? Before these and similar questions can be answered in such a way as to cast discredit upon conscience as an independent and heaven-delegated power there must evidently be a more extended array of arguments, and those more potent, than any yet adduced. Logic has an arduous task to perform before a majority of the human family will believe that the moral sense of men and the social

instincts of inferior animals are essentially one, differing in degree but not in kind. Though, from the argument as presented, we are expected to infer that man may feel remorse such as conscience is fitted to produce, simply because he has yielded to a stronger instinctive desire, thereby doing what judgment pronounces detrimental to the good of the community, we resolutely refuse to gratify the cherished expectation.

Most persons believe in "absolute morality," maintaining that notion of conscience which makes it to differ from even the noblest of mere animal instincts. It is viewed as erecting its own standard of right and compelling one, as he views past conduct, to approve or condemn. For a course of conduct which an awakened moral sense disapproves, no matter how powerful were the temptations, the transgressor is forced to feel regret, sometimes keen and long-continued remorse. In this respect man differs from the animal creation almost as widely as it is possible to conceive.

As already intimated, the acceptance of the proposed theory carries with it the belief that "the right" and "the useful," two distinct ideas, are essentially identical and have a common origin. Even on this hypothesis, the task of proving that the moral sense of man was developed from the social instincts of apes would be an arduous one; for to speak of social instincts having their origin in selfishnesss and ripening into self-denial appears absurd; nor is there less absurdity, in assuming that a regard to the highest happiness of the largest number could have evolved a conscience sufficiently sensitive to condemn practices which a majority of every community must have considered conducive to the well-being of all; and the absurdity, though perhaps less easily comprehended, is but little diminished, indeed in the

minds of some is augmented, by supposing that the social instincts of brutes developed a moral sense capable of enacting and enforcing laws which no amount of intelligence, without the assistance of lessons from experience, could pronounce well-adapted to promote the good of society, being destructive, apparently, to the prospective as well as to the present interests of a large majority. How, for example, could man have acquired his ideas in reference to honesty? "Honesty," as Mr. Hutton says, "must have been associated by our ancestors with many unhappy as well as many happy consequences, and we know that in ancient Greece dishonesty was openly and actually associated with happy consequences." How came our ancestors, in the days of "miserable savagery," or in their previous ape-condition, to look upon marriage within certain degrees of consanguinity as improper? "Savages," says Mr. Wallace, "choose their wives for rude health and physical beauty." It is highly improbable, even if they were able to perceive resultant evils, that they could be induced to condemn incestuous intercourse, much less to discontinue it. And yet, among many savages, so great is the repugnance to such unions that they are rigorously forbidden, though the will of the husband alone determines the duration of the marriage contract. Among the Fiji-Islanders, brothers and sisters, mothers and sons-in-law, fathers and daughters-in-law, brothers-in-law and sisters-in-law are forbidden to speak to each other or to eat from the same dish. In Australia, a man may steal another man's wife, but he may not have a woman of the same name as his own, lest possibly she may be a remote relative. The Eskimos frequently exchange wives as an act of friendship, but care is taken to prevent the union of blood-relatives. This abhor-

rence of intercourse within prohibited degrees could hardly have originated among savages; and to conjecture that it may have arisen in the simial family is to ignore the fact that monkeys of every class are in a pre-eminent degree exempt from sensitiveness upon such subjects.

Nor is it less difficult to perceive how "the advantageous" could have been transmuted into self-sacrifice; into temperance, chastity, truthfulness, gratitude, etc. Regard to the well-being of society is not the only element in these and kindred virtues. They evidently include devotion to God. It is perhaps possible to conceive that feelings of approbation or of disapprobation, sufficiently powerful to prove advantageous to a limited community, may have been transmitted through natural selection. But as the stream cannot rise higher than the fountain, it is impossible to conclude that these feeble emotions could have developed the ennobling conception of duty. The distinction between "the advantageous" and the "obligatory" is so fundamental that the idea of benefit does not enter into the idea of right. "The advantageous" and "the pleasurable" are not contained in the idea of "duty," not even in germ-form. This is conceded by Herbert Spencer, the philosophical exponent of evolution, though he nevertheless maintains that "the experiences of utility, organized and consolidated through all past generations of the human race, have been producing corresponding nervous modifications . . . which have no apparent basis in the individual experiences of utility."

It is moreover worthy of note that the theory in question proceeds upon the assumption that apes, and even inferior animals, possess what man has not attained to, an unerring instinct telling what is for the good of the

largest number; nay, more, it assumes that they are capable of ignoring the lessons of experience and even convincing their companions that more conscientious courses would result in greater good, not to the individual, possibly not even to the existing generation, but to the race in the lapse of centuries.

To believe that the social instincts were the germinating principle of man's moral nature, and that, by the aid of the intellect and through the force of unconquerable habit, they ultimately issued into the golden rule, requires a degree of credulity which few can hope to reach; and to conceive, as this theory does, that devotion to God and self-sacrifice, and even gratitude, have been developed from the unselfishness necessary to the better preservation of brute communities is, in the opinion of most persons, a simple impossibility.

The point of the foregoing process of reasoning is not blunted by saying, The result merely ensues from the survival of the fittest; for how, we may ask, could any considerable number within the limits of the same tribe become possessed of the moral qualities? Evidently they could not; and the remainder of the tribe being incapable of appreciating this high moral tone could not transmit it; nor could the few, since the powerful influence of the many would destroy the slight advances made by a small minority. The variations of individuals become eliminated by the mere force of numbers. Thus the lives of the more moral (rendered more moral to benefit community), would be a self-sacrifice without the faintest hope of benefitting succeeding generations—a martyrdom such as man has never been called upon to undergo.

Darwin, perceiving the cogency of this line of reasoning, assigns two agencies through the operation of which he thinks a large number of the members of any tribe might

have become possessed of these social and moral qualities; namely, the perception that assistance is the loan for assistance, and the effect of praise and blame. These, however, must be powerless just where potency is needed.

If we were to admit that well-defined moral qualities, having their foundation in utility, may possibly have been acquired by a few members or by a majority of some tribe, could it be shown that these qualities would probably be transmitted from generation to generation?—could it be proved that they actually were transmitted? Neither, as we think. It is difficult to discover any ground for the belief that a majority of any monkey tribe could transmit moral qualities which have an origin no nobler and a character no more enduring than that imparted to them by the survival of individuals having infinitesimal measures of increased regard to the good of the community. Moral qualities, such as connect themselves with a law inwoven with human nature, are indeed transmissible. It is undeniable, however, that senseless customs, superstitious practices and meaningless moral distinctions, though widely prevalent and powerful for centuries, cannot be transmitted from parents to children. The Hindoo father does not transmit his horror of unclean food, though he may transmit his detestation of falsehood. The Mohammedan mother has been known to transmit her inclination to theft—as have also wealthy parents in civilized society, as is testified to by kleptomania—but she has not been known to transmit, except by instruction, her shame of appearing in public with unveiled face. The children of the Hottentot may indeed inherit his veneration of some higher power, but not his superstitious reverence for meaningless religious customs. Facts such as these, and they are numerous, would certainly

seem to indicate that moral laws are an essential and not an accidental part of human nature; that they are an indestructible portion of man's constitution and not something engrafted thereon.

That the moral sense possesses an authority such as is not possible to inherited tendencies, even should they become a powerful bias regularly transmitted, is the nearly unanimous conviction of moral philosophers. The approval of right and the disapprobation of wrong are accompanied with a deep-seated persuasion of supernatural authority. Truth, honesty, the spirit of self-sacrifice—all the virtues—are considered praise-worthy and obligatory, not merely, nor mainly, because the noblest of the human family have commended them, but in a pre-eminent degree because they are believed to have the sanction of a Supreme Being, by whom the love of them was inwoven with man's better nature. In like manner, falsehood, envy, selfishness, rascality—all the vices—are deemed despicable, not simply because moralists have dared to condemn them, nor because of a wide-spread conviction that they are poorly adapted to secure either present or future advantages, but because most persons are forced to conclude that man's nobler nature, as it came from the hand of its Creator, involuntarily condemns them. It would be difficult to assign any other satisfactory reason. Certainly the most brilliant success has sometimes accompanied craft, dissimulation, knavery, and selfishness.

Again: if the social instincts are the basis of conscience, all persons, or nearly all, ought to approve what society recognizes as right. Such, however, is not the case. Every person, besides being capable of forming estimates respecting his own acts, also forms judgments in reference to the conduct of others, thoroughly persuaded

that right is right and wrong is wrong independent of man's beliefs and practices. His judgment is independent. He believes himself accountable to God alone. As a right delegated from heaven he exercises the privilege of holding others to a standard of rectitude, though he admits that man's conceptions of duty vary, owing to prejudice and ignorance. Whilst deeming it folly to condemn the conduct of brutes, because they possess no moral sense, he is impelled by an inward necessity to entertain an opinion respecting the moral acts of every sane person. Convinced that all possess conscience, which, though often resembling a palace in ruins, yet speaks of a more glorious past and invites to a nobler future, he considers no argument necessary to prove that it is an original element in human nature. The denial of this, on the part of an occasional reasoner, has little or no effect in destroying his faith in the validity of the argument. Atheists exist. They have advanced labored arguments to substantiate their position. This has not induced theologians to concede that there is no argument in the testimony of the human family to the existence of a Supreme Being.

Will any one pretend to affirm that this "social instinct" theory accounts for the fact that an act is deemed praise-worthy in exact proportion to the unselfishness that characterizes it? The existence of unselfish qualities in our ape-like progenitors would have impeded the improvement of the species. The development of useful qualities is perhaps conceivable, but the development of qualities tending to deterioration is irreconcilable with the theory. We may safely challenge the evolutionist to furnish an instance in which "the disadvantageous" has been transmuted into conscience. His chances for success are slight.

So cogent is the argument which we have attempted to outline, that most persons, even those who deny a supernatural revelation, are ready to admit that the clearest evidences of man's having been created in God's image are found in his moral nature. To see beauty in goodness, and charity, and forgiveness, and love; to admire them even when they are not permitted to mold the life; to condemn wrong-doing, even when practicing it,—these are strong proofs that conscience is an essential element of human nature, the direct workmanship of "a hand divine."

CHAPTER VI.

MAN'S RELIGIOUS NATURE.

IT is nearly impossible to resist the conviction that the hypothesis of man's origin from the ape-family is environed with difficulties more numerous and more serious than those which connect themselves with the theory of his immediate creation. Nor is any one disposed to deny that difficulties which are formidable in connection with the assumed transmutation of animal instincts into reason and conscience become nearly or quite insurmountable in conjunction with the question, "Is man's religious nature an evolution?" Moreover, every unbiased investigator will be inclined to concede that the arguments presented by the advocates of the development-theory become fewer and feebler in exact proportion as the more intricate portions of the problem come under review, the reasoning being weakest just where it should be the most powerful. The greatest force is laid upon the evolution of the physical nature, where confessedly man approximates most nearly to the brute-creation; less, upon that of the mental, where manifestly the difference is wider; still less, upon that of the moral, where the divergence is even greater; least of all, upon that of the religious, where the difference amounts to a measureless chasm. This will become apparent if we present in succinct form all the arguments we have been able to discover in the many books which assert or assume

man's evolution from inferior animals. These arguments, as we might expect, proceed upon the assumption that civilized man, in reaching his present advanced position, has passed through a state of absolute savagery.

The task now before us is to answer the following argument:—

"There is no evidence that man was aboriginally endowed with the ennobling belief in the existence of an Omnipotent God" (*Darwin's Descent of Man*, vol. i. p. 62). "There is abundant evidence . . . that numerous races have existed and still exist, who have no idea of one or more gods, and who have no words in their language to express such an idea" (*Idem*, p. 63). The Paraguay Indians, according to Azara, had no ideas of religion. Sir John Lubbock says, "According to the missionaries, neither the Patagonians nor the Araucanians had any ideas of prayer, or any vestige of religious worship" (*Prehistoric Times*, p. 536). Among the Fuegians, Admiral Fitzroy "never witnessed or heard of any act of a decidedly religious nature" (*Idem*, p. 541). According to Crantz, the Greenland Eskimos "have neither a religious nor idolatrous worship, nor so much as any ceremonies to be perceived tending thereto." Herne states that the North American Indians had no religion: Colden, that the celebrated "five nations" of Canada had no religion and no word for God. "Burton," says Lubbock, "found no semblance of worship among the Comanches." "The Andaman Indians are stated," says Lubbock, "to have no idea of a Supreme Being" (*Prehistoric Times*, p. 437). "The Australians have no systematized religion, nor any worship or prayer" (*Idem*, p. 447). Some savages, it thus appears, have been discovered who have no religion whatever--some say very many. What follows? "Such," says

Lubbock, "was probably the condition of primeval man." Why draw this inference? "Because it is difficult to believe that any people who once possessed religion would ever entirely lose it." Wherein consists the difficulty? "Religion appeals so strongly to the hopes and the fears of men, it is so great a consolation in times of sorrow and sickness, that it is hard to think that any nation would ever abandon it altogether." Though so many savage tribes are utterly destitute of religion, still, "if we include under the term religion the belief in unseen or spiritual agencies, the case is wholly different; for this belief seems to be almost universal with the less civilized races" (*Darwin's Descent of Man*, vol. i. p. 63). Though a savage is utterly incapable of experiencing religious devotion, which consists in love, submission, fear, and gratitude; nevertheless, as he passes from savagery to civilization, he converts belief in unseen influences into fetishism, polytheism, pantheism, monotheism. Thus the higher forms of religion are evidently products of human thought, man's religious ideas becoming more complex and more spiritual as he advances in intellectual and moral attainments. To this spiritual sentiment we have some distant approach in the deep love of a dog for his master. Indeed, Professor Braubach "goes so far as to maintain that a dog looks on his master as a god."

The first sentence in the above paragraph is a sweeping assertion adroitly worded and quite manifestly designed to clear the ground preparatory to the establishment of an opposite theory. Prone, as evolutionists too frequently are, to assign existing effects to causes which have not been proved adequate, Mr. Darwin seems disposed to consider it unnecessary to account for man's religious nature—simply denying that it was an original

endowment and leaving his readers to conclude that of course it is a subsequent evolution. Is this denial so easy of acceptance that it may be safely left unsupported? or does it stand unaccompanied with proof because of the difficulty in presenting evidence to substantiate it? "No evidence"? Whence then the basis in which inheres the sense of obligation to moral law? Whence the conviction, which is quite general, that our relations to Deity are more intimate and more powerful than the tie resulting from commands arbitrarily given? How does it happen that so many entertain the conviction that there is a Supreme Being who possesses moral excellencies which man's constitution forces him to revere? Why is the command, "Thou shalt love the Lord thy God," capable of influencing the human family? Is it merely because the religious emotions have congealed into a confirmed habit through the operation of Natural Selection? Then whence came the original germ of these emotions? These savages, who are declared to be, and to have been through all past generations, entirely devoid of religion, why are they susceptible to spiritual ideas? How did they become capable of conceiving of God as a being of truth, goodness, love, and power? If their ancestors were not endowed aboriginally with the ennobling belief in the existence of an Omnipotent God, they must have been endowed with a religious nature, unless we are prepared to admit, contrary to the teaching of evolution, that this noblest of faculties may be developed, not by the tardy process of Natural Selection, but in a few months by instruction. To be without religion is one thing, to be incapable of becoming religious is another. Which of the two are we to understand was man's original condition? Evidently the latter was not his condition; for the irreligious savage, who

is declared to be in this respect as far advanced as the first man, cannot only be inspired with a conception of God as the embodiment in infinite measure of all moral excellency, but can be induced to give expression to the reverential feelings of his heart—indeed, he is self-moved to worship. Reveal to him the evidences of divine love exerted in bestowing blessings and he is forced to bow in adoring gratitude. This religious element, to which there is not the slightest approximation in the lower animals, enables his soul to cling to his Father above even as the ivy clings to the rock.

In reference to those tribes which are said to be destitute of religion, there is conflicting testimony; though, even if they were without "the ennobling belief in the existence of an Omnipotent God," and even without any religious ideas, it would not follow that they were destitute of a religious nature. Besides, whether they may be said to have religion depends upon the definition we give to the term. We are ready to concede that if by religion is meant a reasonably correct conception of a Supreme Being and of accountability to Him, or if the term is intended as an equivalent for moral convictions which impel to purer lives, or if it includes definite ideas in reference to the immortality of the soul, and no ideas except those which are definite; then, undoubtedly, there are savage tribes devoid of religion: but we insist that if religion is a term which covers belief in, and fear of, mysterious beings more powerful than men, if it may be applied to a vague apprehension of evil consequences as penalties of wrongdoing, if it bears any relation whatever to witchcraft, if it includes ill-defined notions in reference to the continued existence of the soul after death, then savages, probably without a single exception, are religious. The universality of these beliefs among savages is conceded

by all, even by Lubbock. "Even in his religion, if he has any, the savage creates for himself a new source of terror, and peoples the world with invisible enemies" (*Prehistoric Times*, p. 595). "It is not too much to say that the horrible dread of unknown evil hangs like a thick cloud over savage life, and embitters every pleasure" (*Idem*, p. 583).

The Paraguay Indians were believers in witchcraft and in mysterious evil beings. Who is able to prove that these beliefs were not the wretched remnants of a spiritual worship once enjoyed by their more enlightened ancestors? The inhabitants of the southern portion of South America have a vague notion and a horrible fear of a Supernatural Being who is believed to reside in the thick swampy forests: Falkner affirms that the Patagonians are polytheists. Though Admiral Fitzroy "never witnessed among the Fuegians any act decidedly religious," they certainly believe in a mysterious being, if the testimony of reliable travelers has any worth. The funeral rites of the Eskimos indicate belief in the immortality of the soul. It will require more than the testimony of Herne to prove that the North American Indians had no religion. The almost uniform testimony of those most conversant with the facts leaves little room to doubt that, with scarcely an exception, they possessed religious beliefs and engaged in acts of worship.

"Lo, the poor Indian, whose untutored mind
Sees God in clouds, or hears him in the wind;
His soul proud science never taught to stray
Far as the solar walk, or milky way;
Yet simple nature to his hope has given,
Behind the cloud-topped hill, an humbler heaven."

It may be true, as Lubbock affirms, that "the Australians have no systematized religion, nor any worship or prayer," but, according to his own concession, "most

of them believe in evil spirits and all have a great dread of the dark and of witchcraft;" and the burial of implements and arms with the dead is considered as testimony to belief in the continued existence of the soul.

The Fiji-Islanders possessed a mythology resembling that of Greece and Rome—having gods of peace, of war, of agriculture, of good, of evil, etc. They had temples, pyramidal in form, which were erected on terraced mounds as those of Central America. They also venerated upright stones, as the ancient Druids did. So strong was their faith in a future state, and so potent their conviction that as they left this world so would they continue eternally, that children as an act of religion buried their parents alive ere the infirmities of age should come on—the parents cordially and joyously acquiescing. It was a solemn religious duty, a sacred filial obligation. Children and parents were alike interested in securing departure to a better land while strength and health remained unimpaired. The custom we may properly regard as horrible to the last degree, but it testifies to strong faith in the immortality of the soul, and even to kindness of disposition, though it is indeed a kindness begotten of a false philosophy.

We might instance other savages—many of them among the lowest, as the Hottentots and the Bushmen—who undoubtedly possess religious beliefs. Enough evidence has been presented, however, to answer our purpose. Certainly he who takes the pains to examine the facts will be convinced that a majority of savages, if not all, have some religious ideas and engage in acts of worship, though it is true that these are frequently horrid in the extreme.

In weighing the testimony presented by Lubbock and others, it is well to bear in mind that travelers may

easily be mistaken; that some are careless; that others may entertain strong prejudices; that even the most cautious may be deceived, for there are tribes, particularly in Africa according to Livingstone, who consider it sacrilege to acknowledge to strangers their faith in the existence of a Supreme Being. Even to hint at His attributes is regarded as likely to entail the most terrible penalties.

Even suppose it has been proved, or shall be proved, that some savage tribes have no religion whatever, does it follow that "such was probably the condition of primeval man"? Certainly not: for the majority have some form of religious faith. Why infer that the few are more likely to represent the condition of our ancestors than the many? Is it easier to believe that the many have "evolved" religion than that the few may have lost it? Is improvement in religion more frequent than deterioration? Is religious faith one of the few things which man has never lost? The fact that man, whether savage or civilized, both collectively and individually, may be destitute of religion, has as much weight in proving that human nature may sneeringly disregard its highest interests till degeneration ensues, as in proving that its aboriginal condition was one devoid of spiritual emotions. Certainly the loss of these, so far at least as they may be operative for good, is not a thing so infrequent as to render it improbable that any barbarous tribes should have abandoned them. Manifestly the appeals of false systems of faith to man's hopes and fears are insufficient to keep the baser nature in subjection. Experience has shown that in many instances even the claims of true religion have been inadequate to prevent the vicious from spitefully disowning them. Are we not justified, therefore, in concluding that reason sanctions the declaration

of Paul, made in reference to the Gentile world, "Even as they did not like to retain God in their knowledge, God gave them over to a reprobate mind"? "For this cause God shall send them strong delusion, that they should believe a lie."

It is conceded that among savages the belief in spiritual agencies is almost or quite universal. This is granted by both Darwin and Lubbock—indeed, is strongly asserted. Does not this yield the ground upon which their argument is based? No one claims that savage races are civilized nations. Their beliefs must correspond with their condition. Degraded in morals and degraded in intellect, could they be otherwise than degraded in religion? Does the mere fact that there are degraded systems of faith prove that man's progenitors were irreligious savages? Then the simple fact that there are ennobling systems of faith is still more potent in proving that the first man was an enlightened theist. The former argument proceeds upon the assumption that because the religious element is feeble or perverted in savages, therefore it had no existence in primitive man; the latter bases itself upon the fact that as the religious element is universal, existing even in degraded barbarians, and powerful in intellectual nations, therefore it must have existed in its noblest form in the person of man's progenitor. If the belief of savages in some mysterious being or in some unseen influence establishes the theory that man's primeval condition was one of irreligious savagery, then the existence among civilized nations, and especially among the ancient Egyptians, Assyrians, and Tyrians, of elevating religious conceptions, proves that the first man was an intelligently religious being. Since spiritual ideas prevail, in many instances even among savages, they must have descended from pious ancestors.

It is evident, however, that the concession in question was intended to look in an opposite direction. It was designed to prepare the way for the reception of this proposition, "Belief in spiritual agencies would easily pass into the belief in the existence of one or more gods." It was necessary to discover among barbarians a germ from which religion might be developed, for it is somewhat difficult to understand how evolution can produce entirely new faculties, though this is a necessary part of its arduous task. The existence among rude tribes of an indefinable dread of some mysterious being, aids our opponents in marking one stage in the journey passed from apedom to manhood. It assists in producing the conviction that during the period prior to the development of the religious nature, no agencies tending to its production were needed, since in a comparatively few centuries an undefined awe has effected changes so vast and ennobling. If we can be induced to admit that theism has been developed from superstition, it will be easier to admit that superstition has been evolved from an animal's respect for superior power and intelligence—thus the entire religious nature, complex in its character and having vital connections with all man's faculties, will be accepted as a gradual evolution. But does belief in spiritual agencies easily pass, unassisted by instruction, into the belief in the existence of one or more gods? What savage tribe, unaided by instructors from without, has ever abandoned its superstitions for an intelligent faith? What tribe has gradually worked itself into polytheism and through that into monotheism?

The feeling of the barbarian towards superior beings is, we are told, like that of the horse or the dog towards his master. Until this has been proved no notice need be taken of it; when it has been proved christians will

have fresh occasion for glorying. They will be justified in rejoicing that christianity has such potency, being able not merely to evolve theism out of atheism, but capable even of developing the doctrine of the soul's immortality out of the vague conceptions of miserable savages; that possibly the cow, the tree, and the house, as well as man, may continue existence upon the sunny plains of Bolotoo; nay, being even equal to the task of teaching the christian code of morals to those who in their primitive state are incapable of distinguishing right from wrong, and who cannot count more than three. That our opponent's theory furnishes the means of flattering human nature can scarcely be denied; and its advocates have employed it in some instances quite liberally.

In the face of incontrovertible facts, have we the right to maintain that man has been continuously advancing in religious knowledge? Most investigators say, No. Max Müller affirms, "If there is one thing which a comparative study of religions places in the clearest light, it is the inevitable decay to which every religion is exposed." An unbiased examination of those which have prevailed since B. C. 2000 will evidence the difficulty of believing that the christian's ennobling conception of Deity is the mere product of human thought. That religions, with few if any exceptions, have deteriorated is an undeniable fact; that they have become with successive centuries more elevating in their nature, more spiritual in their conceptions, purer in morality, and less meaningless in the ceremonies employed has not been proved. On the contrary it can be shown, we believe, that the earliest religions of which traces exist were comparatively pure, and simple in their ceremonies—were forms of monotheism. That such was the case in ancient Egypt is generally conceded. As we go backwards

through its successive dynasties—through the New, the Middle, and the Old Empires—till we reach the remote period when Upper and Lower Egypt were consolidated into one empire under Menes, we discover more spiritual forms of worship till we reach monotheism. The assertion that civilized man has passed successively through fetishism, polytheism, etc., is incapable of proof; nay, it is in the face of well established facts.

“Religion once was natural,
Priests made it mystery, offerings made it gain;
To roast fat oxen altars next were reared,
And priests ate roast meat while the people starved.”

To say that religion is the product of human thought is to do more than enter a protest against emotional forms of piety; it is a denial that man came from the hand of his Maker a religious being. To consider the knowledge which comes to us through the laws of thought the sole source of religion, is somewhat like tracing the river to the stagnant pool at the foot of the mountain, but refusing to press to the fountain that bursts forth from the sides of the everlasting hills. To believe that religion is man's production may produce a pleasant sensation, but it fails to meet the demands of a rigid investigation. If it is the result of human thought, why are all, even lowest savages, susceptible to its impressions?

Though there are some reasoners who are disposed to assert that there is in nature, independent of a Superintending Being, an orderly arrangement which evinces the existence of an all-pervading intelligence, and that this intelligence, in whatsoever organisms it manifests itself, is self-evolved—the same in kind, differing merely in degree—and that religion is a result of self-acquired knowledge; still, it is safe to affirm that the majority of the human family can never be induced to surrender the

belief that the spiritual element in human nature is an original and essential characteristic, the immediate creation of the First Cause of all things.

Even granting that the religious sentiment principally "busies itself with a wish, a hope and a fear," it does not follow that it has no nobler origin. Because a philosopher employs his reasoning powers upon the metaphysics of religion, are we at liberty to infer that his discursive faculties had their origin in the love of abstract thought?

This school of religious thought assumes that a myth is necessary to religious belief in pre-historic periods, and even since in some nations. A myth is defined as an endeavor to realize the unknown as a power to grant or refuse a wish. The motives impelling to this attempt are affirmed to be "an innate consciousness," "a force," and "a succession of changes," with "a yearning to explain existing phenomena." Whence this "innate consciousness"? Whence this indefinable "yearning"? If we were to affirm that they were implanted at creation, could the statement be disproved? To say the least, christians have as good a right to ask their adversaries to undertake its refutation as they have to expect us to refute their unfounded assertions. Certainly the Scriptural doctrine is as satisfactory and more logical than the theory which assumes that religion is a result of evolution, a development without even an original germ of religious feeling.

Whilst it is patent to all that evolutionists make no effort to show us how the higher forms of human thought have been developed from animal instincts, it is scarcely less evident that in the endeavor to evolve the germs of intellect, of moral sense, and of religious emotion, they proclaim themselves alchemists in psychology, successors

in a higher sphere of the chemical transmutationists of the dark ages. Mingling animal ingredients, and repeating an incantation composed of fanciful analogies and adroit assumptions, they confidently affirm that they are able to distil human essence, whence may be evolved all the races of men and even the marvelous works of human genius, no Creator being needed unless possibly the hypothesis of his existence may be necessary to account for the origin of one or two primordial germs. Perhaps they may find themselves pursuing a mere illusion. It is possible, however, that like their renowned predecessors they may stimulate investigation, which, notwithstanding the incidental mischief done, may result in establishing truth on an immovable basis.

With firm faith in the final adoption, even by scientific men, of the Scriptural account of man's origin, we do well to note the fact that evolutionists have chosen a mode of arguing that is unscientific. They have virtually abandoned the inductive method.

True, they still profess to pursue it while substituting hypotheses and suggestions and analogies and *a priori* reasoning. They seem to have forgotten the scientific requirement that in interpreting nature only causes which have a real existence and are adequate to the production of the effect are to be taken into consideration. Causes are assumed whose existence cannot be satisfactorily proved, much less can they be shown to possess potency adequate to the production of the effects attributed to them. In not a few instances, the explanations given proceed upon the principle that the effect produces the cause. Mr. Darwin when attempting to account for the origin of human affection, assumes that in animals the desire of caressing springs from the habit of caressing. He also traces the growth of speech to man's mental

power and the growth of mental power to the use of language.

Professor Tyndal boldly defends the *a priori* method of procedure, claiming free scope for the imagination and unrestricted liberty to the discursive faculties. In this he has the endorsement of Mr. Herbert Spencer, whose method of reasoning is emphatically *a priori*. Whoever will take the pains to examine his writings will find, amid much that is admirable and not a little that is somewhat misty, clear evidence that the inductive method has been abandoned. Thus it happens that though evolutionists have not succeeded in proving that a single savage has descended from the monkey family, nor indeed that such evolution is possible, they nevertheless expect us to believe their theory. If we object, they assure us that the element of time will certainly work these transformations, though no attempt is made to show that the lapse of time will affect the problem; nay, it is not even proved that these insensible gradations become perceptible after the expiration of fifty centuries. A vivid imagination and a strong subjective faith may be considered as dispensing with the necessity of an objective verification. In the place of Tertullian's maxim, "Credo quia impossibile est," they seem disposed to substitute "Credo quia comprehensibile est." If under the glare of their cherished theory certain propositions are to them conceivable, the inference is drawn—especially if phenomena hitherto inexplicable are seemingly solved—that they have removed the veil from nature's laboratory, disclosing the actual processes by which higher forms were successively introduced till the phantasmagorical procession ended in man's appearance upon the stage as an unclothed savage. Whilst ignoring all parts of the problem except those which may be more readily connected with brute

instincts, they expect us to believe that science enjoins the acceptance of the doctrine that man in all his faculties is the natural offspring of some branch of the simial family.

CONCLUSION.

1. Has it been proved that man's religious nature was not an original endowment? No.
2. Has it been proved that because some savages are without religion, therefore this was man's original condition? No.
3. Has it been proved that man, if he once possessed religion, could not lose it? No.
4. Has it been proved that a vague faith in mysterious beings can evolve itself into theism, provided a few thousand or a few million years are thrown in as a co-operating agent? No.
5. Has it been proved that religion is a product of human thought?—that it is the driftwood thrown upon the shore of the agitated ocean of human feeling?—that it may have had its origin in an ill-defined “wish, hope, and fear”? No.
6. Has it been proved that savages have arisen, unaided, to an adequate conception of their relations to Deity? No. “Some savages have no religion.” Have any of them acquired a system of religious faith by their own exertions? The theory that a race can advance by its own unassisted efforts from a lower to a higher religious faith is unsupported by facts. It may rise by instruction; but of what avail is instruction if there is no in-born power? Some barbarians have religious ideas. How did they acquire them? The simplest answer is that they were carried down with them as they sank into moral degeneracy.

7. Has it been proved that man, if originally an irreligious savage, could have evolved religion? No; far from proving that man has developed religion, it has not yet been proved that he could do so.

8. Has it been proved that the earliest races were without a moral and religious nature? No: it has not even been proved that they were without spiritual ideas and religious ceremonies.

9. Has it been proved that man's worship is the same in kind as the feeling of a dog towards his master? No.

10. Has it been proved that the accepted theory is environed with more difficulties than the new hypothesis? No. "The old is better."

It is for our readers to judge to what extent we have aided them in perceiving that the time-honored doctrine is tenable, logical and consistent with facts.

As a rule attacks upon christianity, whether metaphysical or scientific, do not so injure it as to obscure the hope of ultimate triumph. Unfortunately, these assaults may prevent its adoption by some, and may weaken the faith of others, but the confidence of God's people is in no respect shaken. As has been beautifully said: "Christianity, like Rome, has had both the Gaul and Hannibal at her gates; but as the Eternal City, in the latter case, calmly offered for sale, and sold at an undepreciated price, the very ground on which the Carthaginian had fixed his camp, with equal calmness may christianity equal her magnanimity. She may feel sure that, as in so many past instances of premature triumph on the part of her enemies, the ground they occupy will one day be hers—that the very discoveries, apparently hostile, of science and philosophy, will be ultimately found elements of her strength."

CHAPTER VII.

THE FATHER OF THE ANIMAL KINGDOM.

AT this point in our discussion we are confronted with the oft-repeated assertion that all forms of life owe their origin to one, or at most three or four primordial germs. Who then was the father of this numerous, variously endowed family? If the trilobite, which inhabited the ocean when there were no shores to interrupt its waves, was elder brother to the latest philosopher who has soared into the regions of speculative thought; if organisms possessing the minimum *vitæ* were the parental forms of those endowed with the maximum *rationis*; if creatures having only *parvam scintillam animi* were the progenitors of modern scientists, the latter being but the natural product of the united efforts of millions of pre-existing animals which succeeded after billions of abortive efforts in evolving an intellect capable of recognizing its indebtedness to a long line of self-sacrificing ancestors—apes, fish, worms, monera, etc.,—then the father of us all, however respectable he may have been, evidently occupied an humble sphere in life. Who was he, who, as his family came drifting down the stream of time, left colonies which consented to continue existence that they might point backwards to the beings whence they were evolved and forwards to their ambitious relatives who decided to go on with the process of evolution, hoping that persistency in a course which had already developed

marvelous organisms might evolve some Haeckel who would undertake to write a history of the family, thereby inspiring the hope that in a second period of four hundred millions of years man might develop into some being as much superior to *homo sapiens* as *homo sapiens* is superior to a tadpole?

As Darwin and Haeckel are well versed in the mystic lore of the wonderful genealogical charts left by monkeys, marsupials, lizards, and amœbæ, we shall let them tell us who was the father of earth's family of beings. We might also ask them to tell us who was the father of the father of animals, since we might become too much bewildered were we to essay the task of tracing the shadowy line of descent into the numberless species of the vegetable world from some organism of which the first animal ought to have been developed if the theory is true, for vegetable life preceded animal life, and, as is well known, the one kingdom glides into the other by such insensible gradations that even those who know all things worth knowing can scarcely tell where one ends and the other begins. Moreover, to render the investigation complete, we ought to inquire what particular plant was the parent of all the rest. Having obtained a satisfactory answer to this perplexing question we might be reasonably expected to inquire whence came the germ of life. Did it wiggle itself out of a grain of sand? Alas, we had supposed that matter was helpless. "The despicable dupes of theology" have been illogical enough to imagine that if we may not regard inertia as a property of matter because it is a merely negative term, still we are not at liberty to ascribe to matter the power of originating life. Of the powerlessness of matter to change its condition there is abundant evidence even though we may have no more right to say that inertia is an essential property of

matter than we have to assert that good-for-nothingness is the mark by which we can distinguish the midge from every other entity in the universe. There is no proof that matter can originate life. You have as much reason for affirming that absolute helplessness created the universe as for affirming that inert matter originated life. We are told by Haeckel that life first appeared in "a homogeneous atom of plasson"; by Huxley, that "protoplasm" is the physical basis of life. Will they ascertain whence life came, what it is, and why it selected so humble a tabernacle in which to make its first appearance on earth? Neither protoplasm nor a homogeneous atom of plasson is declared to be life, but simply the body it inhabits; even if it could be proved to be life and the parent of all animal and vegetable existences, the problem of man's origin would not be solved, but merely rendered more intricate. Science would then ask, What was the origin of protoplasm?—what was the origin of this wonderful homogeneous atom? Was matter, which is so helpless that it cannot move itself when at rest, nor stop itself when in motion? Can that which is in itself inactive originate a series of acts extending through ages? When they have forced assent to this, other questions will press for solution. Which material element gave birth to life? Did it annihilate itself in the effort? If not, why has it ceased business? Or, if all matter is resolvable into one element, then what is that element? Why is it no longer turning out products equal to its original gift to the world? How did that element come into existence? What are its properties? Had it more qualities than those which reason decides to be essential to the existence of an atom? Where is the proof that it had any quality not now possessed by matter? If there is no proof, why assume that it gave birth

to life? But it is perhaps said, it must have been subject to certain forces. Well, were those forces inherent in it or were they delegated to it? In either case, can it be proved that they were capable of producing life? And if this can be established, can it be shown that matter has lost some force? But force is indestructible. And yet, if matter once possessed this force, it must have lost it, else life would be still originating in earth's material laboratories, occasionally at least.

Nor would the difficulty be solved even if it should be demonstrated that life, in infant form, had its origin in matter. Logic, if indisposed to question whether such might not be the case would persist in asking, Whence came matter? How came it possessed of this life-giving power? If it is capable, operating with unity of design through centuries, of producing the varied forms of living things, it could not have originated in chance, for every step in its subsequent evolution is characterized by intelligence, suitable means being employed for the accomplishment of ends predetermined. It could not have been self-created, for the self-creation of matter from nothingness is inconceivable—more so than the origination of the universe *ex nihilo* by the fiat of Divine Intelligence, which science is disposed to pronounce preposterous. It could not have been eternal, for modern reasoning has proved this impossible. Besides, the human intellect finds it more difficult to believe in the eternity of matter than in an eternal God. Moreover, if the various species of animals have been evolved from a few parental forms, and these parental forms were evolved from vegetable organisms, and all species in the vegetable kingdom were evolved from a few primordial germs, and these from inorganic matter, then matter, it would seem, ought to have been evolved from some

pre-existing substance as inferior to what we designate matter as this is inferior to mind.

Evolution thus carries us backwards through the cycles of buried millenniums without furnishing a satisfactory solution of man's origin. He has been evolved—that is all it can say. It cannot tell us the origin of this potent principle of evolution by which he was evolved. This must have been evolved from some less complex principle previously existent; this, in turn, from some antecedent, still simpler principle—the succession emerging from the depths of a shoreless infinity.

Life is brief. Therefore it is prudent to content one's self with endeavoring to trace man's descent from the period when, as evolutionists say, his ancestors were animals or at least primordial germs of animal life.

Having proved in the preceding chapters, as is believed, that the christian, if disposed to accept the principle of evolution, or if he shall hereafter feel constrained so to do, is nevertheless under no necessity of regarding man as an evolution from the ape-family, we come to a consideration of the following questions: Is the animal kingdom in its various species, an evolution from a few primordial germs?—Have all species in the lower orders been evolved from the moneron?—Was the parental form, whether cell, germ, moneron, or atom of matter instinct with life, a product of spontaneous generation? In the three succeeding chapters, in which the above questions are considered, attention is invited to the second stage of our argument in favor of the teachings of Scripture in reference to origins. If it has been made apparent that the hypothesis of a God is necessary to account for man's origin; and if, as will scarcely be denied, it is improbable that the tardy process of evolution is the mode which Divine Intelligence chooses to adopt

in calling man into being, is it not easier to believe that clearly marked species of animals were immediate creations than to believe that they evolved themselves from a few germs, or from a moneron, or slipped into being through the successive changes assumed by some atom of matter that chanced to leap over the barrier which separates the living from the non-living? Primordial germs, the moneron, abiogenesis—these claim attention. If it shall be proved that all species of animals evolved from a few parental forms, it will still be competent for the theist to stand bowed in reverence at this threshold of life and ask with an emphasis that might ring through immensity, Whence came these potent germs? How came they possessed of such intelligence?

Consequently, without attempting a refutation of any form of evolution consistent with theism and preferring to assign a broad field for the operations of this champion, we enter an impregnable fortress when we ask atheistic evolutionists to explain the origin of these germs, to say how they became possessed of such potentialities, to show how they could have managed to commence business, to account for the intelligence displayed in the results. With evolution proper, when restricted to its own province, theology has no controversy. With atheistic forms of the theory the christian is in deadly hostility. They tend to rob him of his sacred inheritance.

CHAPTER VIII.

DARWIN'S PRIMORDIAL GERMS.

DARWIN says:—

“There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one.”—*Origin of Species*, p. 437.

Again he says:—

“I believe that animals are descended from at most only four or five progenitors, and plants from an equal or less number.”—*Idem*, p. 432.

“I see no good reason why the views given in this volume should shock the religious feelings of any one.”—*Idem*, p. 428.

I. Why use the expressions, “a few forms,” “four or five”? Was the line of descent traced backwards with certainty to “five”; with probability to “four”; with some evidence to “one”? Why was no account left of the difficulty encountered in the effort to insure accuracy? The author’s statements are usually definite. Positiveness occurs even where we might expect conjecture. The caution manifested in the above passages contrasts strongly with the boldness exemplified in the following assertions:—

“The difference in mind between man and the higher animals, great as it is, is certainly one of degree and not of kind.”

“It is quite incredible that man should through mere accident resemble, in no less than seven of his muscles, certain apes, if there had been no genetic connection between them.”

“Through his [man’s] powers of intellect, articulate language has been evolved.”

“To gain this great advantage [standing firmly], the feet have been rendered flat, and the great toe peculiarly modified, though this has entailed the loss of the power of prehension.”

"I have at least done good service in overthrowing the dogma of separate creations."

"If they [the intellect and moral faculties] were formerly of high importance to primeval man and to his ape-like progenitors, they would have been perfected or advanced through natural selection."

"The five great vertebrate classes, namely, mammals, birds, reptiles, amphibians, and fishes, are all descended from some one prototype."

"At a much earlier period the uterus was double; the excreta were voided through a cloaca; and the eye was protected by a third eyelid or nictitating membrane. At a still earlier period the progenitors of man must have been aquatic in their habits, for morphology plainly tells us that our lungs consist of a modified swim-bladder, which once served as a float. The clefts on the neck in the embryo of man show where the branchiæ once existed. At about this period the true kidneys were replaced by the corpora wolffina. The heart existed as a simple pulsating vessel: and the chorda dorsalis took the place of a vertebral column. These early predecessors of man thus seen in the dim recesses of time, must have been as lowly organized as the lancelet or amphioxus, or even still more lowly organized."

"Man is developed from an ovule about one hundred and twenty-fifth of an inch in diameter, which differs in no respect from the ovules of other animals." [And yet the little human egg develops into an intelligent being, and the egg of the mammoth turtle into a shell with meat in it, though in the embryonic state "they differ in no respect."]

"Every animal and vegetable species has arisen only once in the course of time and only in one place on the earth—its so-called center of creation."

"Man is descended from a hairy quadruped furnished with a tail and pointed ears, probably arboreal in its habits and an inhabitant of the Old World." —Darwin's *Descent of Man*, vol. i. pp. 101, 124, 132, 136, 147, 153, 195, 198; vol. ii. pp. 372, etc.

With such accuracy along the entire line of descent, indefiniteness in reference to the origin of these transmutations seems more inexplicable.

2. If it was possible to trace man's history back so far, it is singular that it could be traced no further. Logic would seem to demand the employment of every available agency of arriving at one primordial germ as the starting point. This would have been simpler and more satisfactory. If divergent species can be proved to have originated in a few parental forms, it is remarkable that the line can be traced no further; and yet we are not in-

formed what insurmountable barrier exists. Evidently it must be a serious obstacle, more serious than the fixity of species, for this has been overthrown, it is claimed. If several starting-points were necessary for the animal kingdom, then we would be naturally inclined to imagine that the division lines in existing species must be such as to have forced this indefiniteness. A few, at least "four or five," lines must have been sufficiently marked to have been perceptible and impossible to erase; and yet it is said that species is merely a variety slightly more permanent than ordinary varieties. Why then is there any difficulty in setting the complicated machinery of evolution to work in developing all living organisms from one single germ? Why imagine that there might have been a few germs, "four or five"? Was it necessary in order that the struggle for existence might result in the destruction of those individuals which did not possess by inheritance a slightly improved structure? Was advance impossible unless some annihilated others in the race of life? Hardly; for the struggle could not have been very intense when only a few creatures inhabited an earth already having oceans, continents and an abundance of food for the sustenance of animal life. Was it that the theory of natural selection could have scope for its operations? No; for natural selection can only operate upon favorable variations in individuals of the same species; and manifestly the primordial germs must have been of different species or of course one would have answered the purpose. It is plain, therefore, that natural selection could have possessed no special advantages from having "four or five" primordial germs as the starting-point of the animal kingdom. The offspring of each separate species, or of each individual germ, could have been in no way affected, under natural selection, by the

offspring of the other germs. The improvement in each of the lines was conditioned, according to the theory, upon slight favorable inherited variations. We quote:—

“Natural selection acts only by taking advantage of slight successive variations.”

“Natural selection acts solely by accumulating slight favorable variations.”

“Natural selection acts exclusively by the preservation and accumulation of variations which are beneficial.”

“Every variation which is not inherited is unimportant for us.”

“Natural selection acts only by the preservation and accumulation of small inherited modifications, each profitable to the preserved species.”

“Unless favorable variations be inherited by some at least of the offspring, nothing can be effected by natural selection.”—*Origin of Species*, pp. 156, 413, 63, 80, 75, 9, etc.

Natural selection is not an agency, according to these quotations, which produces variations, but merely an agency which aggregates and preserves the variations produced by some unknown cause, provided the variations are beneficial to the being preserved. So then it does not require more than one germ with which to begin operations. Moreover, the variations which are produced, as is elsewhere conceded, by some unknown cause, must be slight, otherwise “they would almost certainly soon be obliterated by crossing.” Accordingly, if a few germs are to prove more helpful to natural selection than one germ, their offspring must resemble each other very closely; but if close resemblance was a necessity, then, one germ would have answered the purpose far better. This, under the operation of the same unknown cause or causes, could have produced slight variations. That each of the several germs has been incessantly producing small favorable modifications, the exigencies of the theory demand. Then one may have done so. Evidently, therefore, the assumption that animal life may have originated in a few primordial germs is not only less logical, but is also less manageable, under the law of natural selection.

than the assumption that all animals had their origin in one germ.

Will "a few forms" aid "sexual selection" in producing variations? No; for evolutionists concur in the opinion that "the primitive vertebrates possessed both ovaries and testes." Consequently, at an earlier period each individual was capable of reproducing itself independently, the separation of the sexual organs having not yet taken place. Plainly, therefore, the ancient ancestors of earth's family of beings could not have come under the influence of this law. Moreover, as by hypothesis, the first living beings were the lowest in the scale, there manifestly could have been no sexual selection, for there were no eyes to discern beauty, no ears to hear love-calls, no nose to quaff odors, and no sense of touch to excite the determination to exercise choice. Besides, as is claimed by evolutionists, the first appearance of animal life was either in the form of a simple cell, "nucleus and protoplasm," or in the form of a cytod, "formless matter not yet differentiated." In either case could sexual selection have aided in developing variations?

It is difficult, therefore, to assign any satisfactory reason, deducible from either natural selection or from sexual selection, for assuming the existence of more than one germ.

Nor would a "few germs" furnish man's progenitors with the means of producing variations, for the causes of modifications are pronounced inexplicable. This is conceded:—

"Our ignorance of the laws of variation is profound. Not in one case out of a hundred can we pretend to assign any reason why this or that form has varied." . . . "We are profoundly ignorant of the cause of each sudden and apparently spontaneous variation." . . . "We know not what produces the numberless slight differences between the individuals of each species." . . .

"What first caused these slight differences cannot be explained any more than why one man has a long nose and another a short one."—*Origin of Species*, p. 6; *Plants and Animals under Domestication*, pp. 421, 471, etc.

3. Why is not the stream of animal descent traced backwards into and through the vegetable kingdom? This would have furnished a theme for fanciful analogies and etherial speculations, one which some evolutionist would do well to cultivate; and it would, moreover, have been a help to those who, having been repeatedly told that "where faith begins science ends," desire further evidence that inasmuch as evolution does not begin in an assumption, they are not exchanging faith in an intelligent First Cause for faith in a miracle-working primordial germ. If the former is to be displaced by the latter, and not by scientific certainty, they are inclined to say "the old is better."

Man's parentage ought to be traceable backwards through the vegetable kingdom, for plants are protoplasm, indistinguishable, it is said, from human protoplasm; as really protoplasm as the animals that feed upon them, and without which every animal organism would speedily perish. As evolutionists concur in the opinion that vegetable life existed on the earth prior to animal life; and as plants alone, to appearances at least, are capable of originating protoplasm from the material elements in nature; and as they have not only a frame-work, about which the tabernacle of life is constructed, but also have a principle of life which is capable of organizing matter into new forms, each new form possessing the power of reproduction by developing a fertilized egg, capable also of originating variations which are accumulated and preserved by some agency; and as they assimilate their own appropriate food, extracting from earth, air, and water the materials which can be incor-

porated into their structure; and as they are sensitive to the external influences of heat and cold, in some instances even to the sense of touch; and as, when living, they can with difficulty be distinguished, in some specimens, from lower forms of animal life; and as, when dying, they surrender the material, from which they constructed themselves, back to earth,—we are correct in thinking that evolutionists should have traced man's parentage through the vegetable kingdom, telling us which plant was the father of the numerous family of animate existences.

Having solved this intricate problem, evolution might perhaps have found itself fitted for the task of following the shadowy line of man's descent into and through the mineral kingdom, informing us why plants and not animals are capable of feeding upon mineral substances, why the vegetable kingdom is intermediate between the mineral and the animal, closing the protracted discussion with the announcement, "I have discovered the element from which all nature, in its myriad forms of existence, has been evolved." But no, the wings of speculation, exhausted by over-exertion and bedabbled with the waters of earth-born philosophy, fall powerless. By a process of induction, Lockyer's *a priori* speculations in reference to the evolution of matter from one element might have been eclipsed. Impetus might have been given to modern investigation. Questions demanding a solution might have been answered.

If the course here recommended had been adopted, preparation might have been made for a still loftier flight. It would have been possible to speculate in reference to the origin of this primeval material germ, containing such potentialities. It might have been conjectured that it slowly evolved itself from nothingness, which

must have rolled for ages over the fields of space seeking to annihilate itself in an atom of dust and destined to attain to consciousness when imprisoned in a human being.

It is impossible to ascertain from which of the "few forms" man descended. Did each of the germs produce a human being, thereby furnishing a basis for the opinion of those ethnologists who divide the family of man into several species? No; for it is affirmed:—

"Those evolutionists who admit the principle of evolution will feel no doubt that all the races of men are descended from a single primitive stock.—*Descent of Man*, p. 220.

Consequently, it is argued that the races of men constitute one species, though it is claimed that for the purpose of expressing existing differences, they might be designated distinct species.

If man's line of descent is to be traced back to one of these germs, then one germ would have answered all the conditions of the problem. As it is, we are unable to determine in which of the several lines to search for our earliest progenitors.

These primitive germs must have been richly endowed. They must have possessed, (*a*) the principle of evolution, which we presume was itself evolved during antecedent millenniums; (*b*) every organism that has since been evolved, for those who believe that Omnipotence cannot produce something from nothing, will not imagine that a simple germ can evolve what it does not contain—evolution implies involution—evolving presupposes a process of involving; (*c*) intelligence, for man, a lineal descendant, possesses it; (*d*) mind, since their offspring is in possession of it, call it what you may, "refined matter," "spirit," or "a substantial entity" having properties which no material substance has; (*e*) conscience and religion, for

these, even if they were evolved from "the social instincts of the lower animals" and from "a wish, a hope, and a fear," must have been latent in these parental forms, since the principle, "from nothing, nothing can be produced," is eternal in its nature and universal in its application. These little germs, though like every other germ, ninety per cent water, must have been "microcosms," little worlds of being. Is it easier to believe that all animal organisms evolved from these than to believe that distinct species are immediate creations?

These minute germs are declared to have been simple, and they must have been alike, for the human embryo, it is affirmed, differs in no respect, in its earlier stages, from the embryos of other animals; for example, from that of the dog, the horse, the whale. Though all simple, and in no respect different from each other, being no doubt indistinguishable under the most powerful microscope, as all animal embryos in their first stages are declared to be, they must nevertheless have developed along divergent lines. What caused this divergency in the course of their development? What causes the canine egg to develop into a dog, and the human egg to develop into a man? If, as is asserted, they differ in no respect so far as their material structure is concerned, then manifestly there must be associated with them a substantial entity, a something which I may denominate "life," which causes them to differ so widely when full grown. For the divergent development there must be a cause. If, as must have been the case, these several primitive germs developed along different lines, and if, as also must have been the case, they "differed in no respect," then they must have possessed an independent principle of life, one which matter could not furnish. They must have been a direct creation, and if creation occurred once, as is

evident it did, is there anything irrational in supposing it may have occurred more than once? Darwin's primitive germ is supplied by a direct divine interposition: Haeckel's "primeval parent of all organisms" is the child of spontaneous generation. In either case, is it conceivable that these simple germs, ninety per cent water, and differing in no respect from ordinary germs, for "all germs are precisely alike in material constitution," could have possessed concealed powers adequate to the task of developing into species as widely different as man and the ascidian?

If the reader is disposed to regard this as inconceivable he is prepared to ask, Is it less inconceivable that these primordial germs, which could not contain all the potentialities needed, should acquire during the course of their protracted development fresh materials, or more potent organizing agencies, or new life-principles, adequate to the task of originating all animal organisms, and acquire them too, independent of Divine Volition?

If these original parental forms were dissimilar, and if each was a simple cell, uncompounded and undifferentiated, as we are given to understand must have been the case, then the difficulty is increased in exact proportion to the number of primitive germs; for, while it is impossible to determine why or how one simple uncompounded cell should or could evolve, it is increasingly more difficult to understand how each of several uncompounded and dissimilar germs should happen to differentiate. How can a single substance proceed to become complex? But the difficulty is increased, for an organized germ, it is elsewhere affirmed, is not "a homogeneous substance throughout." How then can such a heterogenous homogeneity succeed in evolving

itself into greater complexity? And yet each of these primitive germs must perform this remarkable feat.

Nor have we exhausted the catalogue of difficulties. If, as evolutionists would concede, bisexuality must have been an attribute of each primitive animal organism, then how have males and females become distinct? Certainly a bisexual animal could not have been suddenly transformed by natural selection into two animals, a male and a female, for natural selection can never take "a great and sudden leap." Hence, if these "individuals capable of reproducing themselves independently" became the ancestors of unisexual individuals, it must have been because natural selection took "advantage of slight successive variations." But it is repeatedly asserted that natural selection can accumulate and preserve no variations unless they are beneficial to the being preserved. Of what conceivable benefit, however, could it be to a bisexual animal to preserve slight modifications tending towards the production of a unisexual animal? Evidently none whatever. Nay, the case is stronger, for injurious variations, it is affirmed, are certain to be eliminated; and unquestionably the smallest variation in a bisexual animal towards the production of a male or a female, or towards becoming either, would prove disadvantageous, destroying the possibility of reproduction, thereby putting an end to the transmission of unisexual peculiarities. Manifestly, such individuals, even if they continued capable of self-reproduction, would not be the fittest to survive, being weakened in one half of their organism without any counterbalancing advantages, unless it might be the faint hope that after millions of self-sacrificing generations had perished, unisexual animals might exist. What advantage, however, would this be either to the immense

numbers which in measure unfitted themselves for the struggle of life, or what advantage to the race in general? Absolutely none.

To the numberless perplexing questions which the theory prompts us to ask, the evolutionist presents this invariable reply, "the primitive cells were like those in every living animal organism." Whence then came the life which organizes living cells into a symmetrical body? It is folly to pretend that the life of an animal is nothing more than the aggregate life of the individual cells. Accordingly, we ought to have been informed whether these assumed cells possessed the life-principle, or were merely a material substance endowed with only that life which belongs to a simple cell. They are denominated simple cells, it is true; nevertheless, they are regarded as the parents of all living organisms. If they were germs capable of producing animal-life—a something distinct from cell-life—then they were not so simple after all. Is it possible that these cells were simple, when, according to hypothesis, they evolved all living beings—evolved them without the aid of natural selection, survival of the fittest, or the struggle for existence? They must have been a compendium exceedingly marvelous.

Though munificently endowed, how shall they begin to operate?

I. Being but germs they must first develop into living beings. This result must have been effected by the power conferred upon them at creation; for it is impossible to believe that they did it by their own unaided exertions. External conditions, it may be, called these inherent powers into activity; but unless they existed, environment could effect nothing. Why not say at once, God created a few animals? This would have obviated

many serious difficulties. Moreover, it is injudicious to say "germs," unless one is prepared to show how these evolved animal-life independent of the powers originally conferred upon them. Atheistic forms of evolution are specially called upon to show how uncreated germs could have succeeded in originating the first animal, an animal capable of developing all subsequent animal organisms; it ought to be shown how even created germs, unless endowed with adequate inherent power or under constant direct superintendence, could produce such results. Unless this is possible, an animal should be assumed as the starting-point. This lowest organism should then be proved capable of evolving all higher forms. We ought not to be bewildered by the endeavor to ascertain how evolution became possessed of such powers, and how it transacted such an amount of business on capital so limited. If it was operative during the cell-period and began the development of an animal out of nucleolus, nucleus, and the enveloping protoplasm—out of an egg ninety per cent water and the remainder mostly a substance indistinguishable from albumen—then as neither water nor albumen is life, the process ought to have begun further back than the material substance which life organizes into a body. If evolution was willing to accept the hypothesis of a Creator who originated these germs, it would relieve itself of many difficulties by assuming the creation of at least one animal fully endowed with powers to evolve all other animal organisms, or under continued Divine Superintendence during its successive evolutions. How it could otherwise effect the requisite transmutations is an unsolved enigma.

2. Having, for some inexplicable reason, determined to develop into animals, these germs must next decide which way to evolve, upwards or downwards. If they

had made a mistake, as many of their descendants have done, we should have had evolution towards greater simplicity. Perhaps, however, it may be said, that as they were simple they could become no simpler. If they were so simple that they could become no simpler, then they were so simple that greater complexity was improbable, for though "evolution is from the homogeneous to the heterogeneous," it does not follow that the homogeneous invariably evolves into the heterogeneous. Moreover, as the complex frequently degenerates into the more simple, it would be hazardous to affirm that a germ capable of evolving all living creatures could by no possibility become less heterogeneous. Evidently, therefore, degeneration was possible, or at least improvement was not certain. No sufficient reason has been assigned why these germs should evolve upwards,—confessedly in subsequent ages organisms have deteriorated. Retrogression is nearly as frequent as progression. It is strange, then, that in the initial period, evolution, in every instance, was towards higher forms.

3. Having decided to evolve upwards, as it seems these germs all did, they had next to choose the particular direction they were to pursue and the agencies they were to employ. In which direction shall they push their latent energies? Is their intelligence, which is inexplicable in its origin and marvelous in its working, equal to the task of answering this perplexing question? As, by hypothesis, they were the lowest of animals, if animals at all, headless, eyeless, mouthless, limbless—simple sacks with internal organs too minute to be perceptible by the most powerful microscopes, though adequate to the absorption and assimilation of material atoms—evidently it was difficult to determine which organs should be evolved first, and still more difficult to effect the evo-

lution. Possibly one, having formed an abstract idea of a head, undertook its development. The process is continued uninterruptedly through millions of generations till sufficient material has been accumulated in one spot and for one specific purpose, the formation of a head. All temptations to employ this material to form legs or arms have been successfully resisted. A nerve now becomes sensitive to the light. A spot where the skin is thin becomes sensitive to odors. Near this, owing to the stretching of the skin, the absorption of food has become somewhat easier. A mouth is in process of formation; and of course an alimentary canal will follow. Tens of millions of generations have been necessary to attain these results. Myriads of chances of losing these slight increments of improvement, during this protracted period, have come and gone; still, the mysterious process goes on uninterruptedly. Individuals that for tens of thousands of generations have been endeavoring to develop a leg have intercrossed with these head-forming individuals and have striven to employ the accumulated material in the formation of some means of locomotion; but the "head"-tendency has been preponent, and now a perfect head crowns the combined efforts of billions, though the happy possession of but one.

This seems considerably like a miracle.

What has happened? A single intelligent design has been effected by the combined agency of millions of unintelligent creatures operating through thousands of years, without Divine Superintendence and under conditions in which, in the first transformation at least, no conceivable agency, not even natural selection, could have operated. These individuals, while freely intercrossing, as they must have done, with the descendants of unimproved varieties, still persisted in the purpose of

developing a head, accumulating and preserving slight increments of advancement headward, though, for aught that can be made to appear to the contrary, inter-crossing must have occurred between individuals, one of which was devoting all its energies to evolve a head and the other taxing all its powers to develop a leg. How are we to account for the fact that these antagonistic purposes did not destroy each other? Were the descendants of the several germs kept apart till one family had developed a head; another, a pair of legs; another, fins. Or did each family evolve all the organs? If so, did each develop them concurrently, or each, successively? or some concurrently, and some successively? How were all these purposes carried forward to completion without producing confusion? This is an enigma which evolutionists will find difficulty in answering.

Nor is this the only difficulty. The tendency to revert to ancestral forms is as powerful as the tendency to preserve increments of improvement; and the tendency may lie latent in organisms for thousands of generations. It is affirmed:

"In every living creature, we may feel assured, that a host of lost characters lie ready to be evolved, under proper conditions. . . . What can be more wonderful than that characters which have disappeared during scores or hundreds or even thousands of generations, should suddenly reappear perfectly developed? . . . This principle of reversion is the most wonderful of all the attributes of inheritance."—*Animals and Plants under Domestication*, vol. ii. pp. 446, 447.

Let us suppose that in every thousand individuals, one reverts to the ancestral form. Then in a million individuals, which are seeking to develop a leg, one thousand would become legless by reversion in a single generation.

In the same generation many more might revert to

intermediate ancestral forms—indeed we may believe they would. These deteriorated animals, in every conceivable stage of reversionary structure, would tend powerfully, by mating with unimproved individuals, to evolve the leg away from all. If, in spite of this barrier to the successful evolution of a leg, some favored individuals, by mating with each other, should succeed in their endeavor, how is it possible to resist the conviction that the less favored individuals, would either have perpetuated their half-legless condition to the present time, or have left traces of their existence in the rocks which contain a full account of past transformations. Strange to say, we have no testimony to the existence of generations that lived while a leg was in process of formation, nor to the thousands of individuals, which must have reverted to the transitional stages of leglessness. And yet, as is conceded by evolutionists, not one single transitional form has been discovered. What becomes then of the theory that highly organized animals have been slowly developed through millions of generations from a few germs or from an uncompounded, undifferentiated mass of nucleus and protoplasm?

4. The theory requires us to believe that through a graduated scale of beings the higher forms of animals have evolved, the process extending through all the intermediate links from the lowest animal organism up to man and occupying millions of years for its completion. There evidently must have been an intelligent design, a judicious adaptation of means to ends. Where did this intelligent purpose reside? Manifestly not in material nature.

Nor could it have resided in the individuals of each succeeding generation, and have been by them transmitted to offspring, for how could the polyp have pos-

sessed an intelligent design in reference to the adaptation of means for the evolution of the first man from ape-like progenitors. Even if he had possessed this remarkable prescience, its transmission through generations, to all of which it must have been a hidden treasure, would have been an impossibility. To believe, as the theory requires, that such wisdom may be resident in the succession of individuals demands a measure of credulity in comparison with which the faith which accepts, in a literal sense, the Biblical account of Jonah's residence for three days in his piscatorial home, without air and without conversion into whale, is a mere child half smothered in rationalism.

If my neighbor should discover a poem, written in modern English, traced in solid rock underneath several layers of superincumbent earth, the layers evidently being precisely the same in every respect as they were when left by the hand of nature, he would be forced to ask, Whence came these sentences? I, being an evolutionist, volunteer my solution: Neighbor, animals of the lowest form crawled over that material when it was plastic clay, soon after the close of the azoic period, when as yet life pulsated in no more complex organisms than trilobites. In the infinity of trails possible to be made by these primeval creatures, this poem was one.

Not convinced, my neighbor responds: It is inconceivable:—there are quintillions of chances against one, that these animals should have crawled out intelligible sentences:—besides the English language must have been evolved in comparatively recent centuries, being an illustration of the theory of progression under the superintendence of the struggle for existence, survival of the fittest, environment, etc.;—like the grass on the grave of your babe, the English language waves over the tomb of

the dead, and is as unlike any language that went before as that bending blade of luxuriant grass is unlike to the prattling child which you pressed to your bosom when intelligence beamed in its eye, and deposited in its coffin when the throbbing heart ceased to beat.

I reply: For millions of years animals crawled over this rock when it was mud, crawled in every direction,—can you prove that among the trillions of possible tracks taken by quadrillions of creeping things during chiliads of ages, it was impossible that this sentence, and even this entire poem, should have resulted?

My antagonist thoughtfully answers: No, I cannot prove it; but I supposed it was your business to prove how the poem originated, not mine to force reason into the acceptance of an explanation which has a countless number of chances against it and scarcely one in its favor.

Warming with enthusiasm, I add: Moreover, it is impossible to determine the potency of physical agencies; nay, impossible to prove that in those remote eras forces were not in operation that have long since ceased to operate; the animal's legs might have been directed by the power which evolved a world out of chaos.

To return within the circumscribed limits of reason, one is disposed to ask, Is there less wisdom manifest in the construction of an eye, an ear, a hand? No: there is more. There is, then, an almost infinite number of chances against the assumption that animals, groping in every conceivable direction for improvement, should have stumbled upon and should have subsequently followed the shadowy line which was to issue in the evolution of an eye, an ear, a hand, a heart, a brain, a nervous system; and having evolved each of these complicated organs should have manifested wisdom sufficient

to transmit them as a permanent, unimprovable legacy to their descendants. He who is capable of believing that primordial germs, without the superintendence of Infinite Intelligence, have evolved all animals from the moneron to Archbishop Butler, ought to maintain logical consistency by asserting that these primitive germs originated by evolution from inorganic matter. He should make his theory sufficiently extensive to sweep the universe. He ought to conceive that space, impelled by some energy evolved from nothingness, originated an atom of matter, which, being infinitely divisible, diffused itself throughout immensity, filling its fields with an attenuated ether; that this, impressed with forces, commenced to concentrate, dropping at successive intervals matter sufficient to form nebulae; that the matter, thus sloughed off from the periphery of the revolving mass to form solar systems, continued the process of concentration, throwing off at convenient distances, the material that was to form worlds, the residuum remaining as a central sun which lighted and governed its material children; that the matter left to form each world continued to concentrate, and after throwing off moon-material condensed into gas, water, earth, rock; that some earth-atom evolved itself into a lichen, thus originating life, which under the manipulations of evolution has covered continents with vegetable forms, and peopled earth, air, and water with swarming millions of living creatures.

If we are to adopt a theory of evolution which shall dispense with the necessity of an intelligent First Cause, why not indulge in speculations fitted to foster the hope of reaching realms where reason no longer fetters the imagination?

Another objection to the acceptance of the theory

that all living creatures have a common parentage in a few primordial germs, is the time required for the transformations. These must have required, it is affirmed, at least four hundred millions of years, if not, indeed, twice or thrice that period. But unfortunately, there is no evidence that the earth was fitted to sustain life in eras so remote. Confessedly, a measure of heat sufficiently intense to fuse metals is incompatible with any form of life known to us; and according to the careful computation of Sir William Thompson, this planet was a molten mass four hundred million years ago, if not as recently as half that period; and has not been sufficiently cool to admit life for more, at longest, than one hundred million years. This, however, is pronounced too brief for the changes that have occurred. The formation of animals, to say nothing of the formation of plants in an antecedent era, demands, on the hypothesis that they have been evolved from a few primordial germs, a more protracted period. The transmutations of species, implied in the theory, could not have been effected, we are repeatedly assured, in less than four hundred million years, if indeed in a period so circumscribed. In that remote era, ere radiation had lowered the temperature of the solar system, the earth and the sun must have been in a gaseous state, unless the cooling process has been progressing more rapidly in the last few thousand years than in antecedent periods. That this has not been the case may be argued from the uniformity of nature's laws. If the heat of the earth and of the sun was not uniformly more intense through each past millenium some reason should be assigned for the belief that it may not have been. Were these primordial germs evolving new species during the gaseous period? No; for it is conceded that life could not have been in existence on the earth during this state. Conse-

quently, it is incumbent to prove, either that these transformations could have occurred in a briefer period, or that the Uniformitarian Theory of nature is a delusion.

By way of rebuttal to the above line of reasoning, it may perhaps be said that there is no satisfactory evidence that the solar system has been undergoing a process of cooling; that there is no such thing as absolute waste in the universe, that consequently heat which has passed from the sun is not wasted, but necessarily exists somewhere, since it cannot become a nonentity, nor remain *in vacuo* or in empty space, that accordingly there is as much heat in the universe, and probably as much in the solar system, as there ever was; that inasmuch as heat is absorbed sunlight and has no existence till light becomes imprisoned in matter,—it is more consonant with reason to believe that the heat of the solar system has been substantially the same in amount since the period when planets came into existence.

Possibly this may be true, perhaps is as near the truth as the conjecture that the solar system is continuously losing heat, and has been during the period of its existence. This, it is true, would dispose of Mr. Thomson's argument to the effect that the earth has not been in a condition to support life for more than a hundred thousand years; but it is equally destructive to the theory, maintained by nearly all evolutionists, that the matter which now constitutes the solar system was once in a molten state, and antecedently in a gaseous condition. Consequently, they must either surrender the hypothesis that the planets are an evolution from pre-existing nebulæ, or they must admit that the earth has not been in a condition to sustain life for the period of time which they assert is necessary to account for the transmutations which have occurred in the animal and vegetable kingdoms.

Either material evolution did not occur under the operation of heat, or the world has not been in a condition to sustain life for the protracted period which the theory of transmutation demands.

Prof. Huxley at one time announced his belief that *bathybius*, a gelatinous substance found in the bed of the ocean, was the progenitor of all living creatures. Strass affirmed, "Huxley has discovered *bathybius*, a shining heap of jelly on the sea-bottom. By this the chasm may be said to be bridged and the transition effected from the inorganic to the organic." The existence of *bathybius* rendered it impossible, in his judgment, for a reasonable man to retain faith in Scripture. Alas, the fruitlessness of human speculation! The insecurity of pinning faith to the dictum of an erring mortal! *Bathybius*, on careful investigation, turned out to be sulphate of lime. Prof. Huxley publicly repudiated his child. Poor *bathybius*, named so grandly, honored so greatly, praised so unstintingly, has been laid to rest. Though his brief life was an imposing pageant, his birth, it seems, was a blunder, his old age a burden to his friends, his death the removal of embarrassment, and his burial a relief.

Mr. Darwin's statement, so far as it may be understood as conjecturing that possibly there may have been but one primordial germ, will come under review in the succeeding chapter.

CHAPTER IX.

HAECKEL'S PATER FAMILIAS, THE MONERON.

PROFESSOR HAECKEL of the university of Jena, though defending evolution with as much pertinacity as Mr. Darwin, nevertheless differs from him in reference to the origin of life, asserting that the moneron, "the lowest of living beings," originated in spontaneous generation from inorganic matter. To appearances, he agrees with Lamarck, who, although he knew nothing of natural selection, originated the theory of the transmutation of species, and firmly believed that there was no essential difference between animate and inanimate nature, the causes which transform the one being the same as those which transform the other—agencies which may be designated under a natural, uninterrupted, necessary evolution.

These monera, spontaneously evolved from inorgana, Haeckel regards as "the primeval parents of all other organisms." He defines the little miracle-workers as follows:—

"Monera . . . are not only the simplest of all observed organisms, but even the simplest of all imaginable organisms. . . . All trace of organization—all distinction of heterogeneous parts—is still wanting in them. . . . The whole body of these most simple of all organisms—a semi-fluid, formless, and simple lump of albumen—consists in fact of a single chemical combination. . . . Monera . . . are organisms not in any way built up of distinct organs, but consist solely of a single chemical combination, and yet grow, nourish, and propagate themselves. . . . We have the simplest of all species of organisms in

the monera, whose entire bodies when completely developed consist of nothing but a semi-fluid albuminous lump. . . . Propagation of the monera is by self-division. A pinching-in takes place, contracting the middle of the globule on all sides, and finally leads to the separation of the two halves. Each half then becomes rounded off, and now appears as an independent individual, which commences anew the simple course of vital phenomena of nutrition and propagation. . . . When the moneron moves itself, there are formed on the upper surface of the little mucus globule shapeless finger-like processes, or very fine radiated threads; these are the so-called false feet or pseudopia."—Haeckel's *History of Creation*, vol. i. p. 186, 330, 334, 344, 345.

We are safe, we think, in affirming that Professor Haeckel degraded the moneron in order to assist reason in accepting the theory of spontaneous generation. He says:—

"Only such homogeneous organisms as are not yet differentiated, and are similar to the inorganic crystals, in being homogeneously composed of one single substance, could arise by spontaneous generation and could become the primeval parents of all other organisms. . . . Through the discovery of these organisms, which are of the utmost importance, the supposition of a spontaneous generation loses most of its difficulties. . . . We can easily imagine their origin by spontaneous generation."—Haeckel's *History of Creation*, vol. i. pp. 185, 332, 187.

Let us see if he has not degraded the moneron to such an extent as to unfit it for becoming "the primeval parent of all other organisms." Possibly, in pronouncing it so simple that "we can easily imagine its origin by spontaneous generation," he has inadvertently pronounced it so simple that reason is incapable of perceiving how all forms of life could be evolved from it.

If, as is affirmed, "the moneron is not only the simplest of all observed organisms, but the simplest of all imaginable organisms," then it is not a living organism. A crystal, a lump of carbon, a ball of platinum—each an organism—would be pronounced simpler than the moneron. It is even possible to conceive that there should

be a drop of albumen which was not a moneron; and yet in this albuminous lump there is organism, an arrangement of the atoms in reference to each other. If this drop by some mysterious process, known only to spontaneous generation, became possessed of the power of moving itself, or forming "shapeless, finger-like processes," of propagating itself, of developing in the lapse of time all animal existences, it should no longer be denominated "the simplest of all imaginable organisms." In becoming possessed of these powers it must have ceased to be "a simple lump of albumen." If after spontaneous generation had done its work it was "nothing but a semi-fluid albuminous lump," then it was not a living organism; for as Huxley avers, "No living creature is throughout of homogeneous substance," and as Darwin asserts, "Each living creature must be looked upon as a microcosm—formed of a host of self-propagating organisms, inconceivably minute, and numerous as the stars of heaven." Accordingly, if the moneron is "one single homogeneous substance," it is not a living creature. If on the other hand, it was a living organism, then the author has slandered it by describing it as "a semi-fluid, formless, and simple lump of albumen," "homogeneous and formless matter," "homogeneously composed of one single substance," "nothing but a semi-fluid albuminous lump," which "we can easily imagine to have originated in spontaneous generation." For such slander adequate apology is not found in its being twice denominated "a single chemical combination," for this expression must be interpreted to mean "one single substance," "a simple lump of albumen."

Fewer difficulties would environ the theory if the moneron were described as a simple cell. It is not, however. He affirms:—

"Cells by no means represent quite the lowest grade of organic individuality . . . There are yet more elementary organisms . . . These are cytods . . . For example, the monera are cytods of this kind . . . Strictly speaking the elementary organism of the individual . . . occurs in two grades. The first and lowest is the cytod, which consists merely of an atom of plasson. The second and higher grade is the cell, which has been differentiated into nucleus and protoplasm. As a rule the nucleus of the egg is a soft, often vesicular texture. Within this nucleus, as in many other cells, is enclosed a third body which in ordinary cells is called the nucleolus. Lastly, in many, but not in all eggs, within this germinal spot is found another little point, a nucleolinus, which may be called the germinal point . . . The simplest cell consists of at least two parts, the inner firmer kernel, and the outer softer cell-substance or protoplasm. These two distinct parts can only have come into being by differentiation of the homogeneous plasson of a moneron."—Haeckel's *Evolution of Man*, vol. i. pp. 118, 130.

It seems as though the initial processes would have been less inexplicable if evolution had begun in a perfect cell with its "protoplasm," its "nucleus," its "nucleolus," and its "nucleolinus." The cell, however, is evolved from the homogeneous plasson of a moneron, *i.e.*, from "a simple lump of albumen." This is not only a living creature but it is capable of differentiating into a heterogeneous substance. How did the "lump of albumen" transmute itself into "plasson"? How did the "plasson" evolve a cell with its "inner firmer kernel and its outer softer cell-substance or protoplasm"? We know what is meant by the differentiation of a germ. This, however, is not one single substance, a simple "albuminous lump." Until we are aided in conceiving how a cytod could have evolved into a one-celled organism, it is difficult to believe that the moneron is "the primeval parent of all organisms," since "all animals, including man, descended originally from a one-celled organism." If the moneron is included in the term "all animals," then it is not "primeval," but some "one-celled organism" is; if it is not included, but is the "primeval parent" of all animal

existences, then why say, "all animals, including man, descended *originally* from a one-celled organism"? They must have descended "*originally*" from the moneron, an organism more elementary than cells.

It is also asserted that in the moneron, "all trace of organism, all distinction of heterogeneous parts, is still wanting." "It is nothing, when fully developed, but a semi-fluid, formless, and simple lump of albumen." How then can we conceive it capable of being the progenitor of all animals? And yet this organless creature has the power of moving, of assimilating food, of self-propagation. Can it carry forwards the functions of vitality—locomotion, nutrition, reproduction—without organs? How can it throw out "shapeless, finger-like processes, the so-called false feet" if "all distinction of heterogeneous parts is still wanting"? Wherein resides the power of absorption if there are no organs? By what agency is the "pinching-in process" carried on till self-division results?

As described, the moneron must have organs; and if it has organs there must have been a long series of antecedent organisms.

Mr. Haeckel affirms:—

"Every organism, composed of organs, can only have originated from an undifferentiated lower organism by differentiation of its parts and consequently by phylogeny."

Then the moneron, since it has organs, must have originated by differentiation from an undifferentiated, lower, older, and simpler form, and consequently by phylogeny. By phylogeny!—there must have been not only one organism anterior to the moneron but many, for he defines phylogeny as the history of the protracted descent of germs from pre-existing organisms. The moneron, if it

has organs, must be the result of a vast number of transmutations on the part of pre-existing species.*

If to avoid this embarrassing conclusion we lay stress upon the assertion that the moneron is wanting "in all distinction of heterogeneous parts," then we are forced back upon the assumption that a living creature can possess functions of life, can appropriate food, can move, can grow by the assimilation of food taken within its simple lump, can reproduce itself, without any organs whatsoever. An assumption so absurd needs no refutation.

The author of *The Evolution of Man*, *The History of Creation*, *General Morphology*, etc., seems to be under a fatal enchantment forcing him, in his philosophical inquiries, into many contradictory statements. As he is treating profound themes which few presume to handle, and as he discourses upon them fully and with a measure of originality rarely met with, a few contradictions might be expected to occur and would be generously condoned, but the antagonistic statements are so numerous, and so palpably self-destructive, that charity finds it difficult to throw her mantle over them. Will

* "The history of the evolution of organisms consists of two kindred and closely connected parts: Ontogeny, which is the history of the evolution of individual organisms, and Phylogeny, which is the history of the evolution of organic tribes. Ontogeny is a brief and rapid recapitulation of phylogeny. . . . The individual organism reproduces in the rapid and short course of its own evolution the most important of the changes in form through which its ancestors . . . have passed in the slow and long course of their palaeontological evolution. The history of the germ is an epitome of the history of descent; or in other words ontogeny is a recapitulation of phylogeny; or somewhat more explicitly, the series of forms through which the individual organism passes during its progress from the egg-cell to its fully developed state, is a brief, compressed reproduction of the long series of forms through which the animal ancestors of that organism have passed from the earliest periods of so-called organic creation down to the present time."—Haeckel, *Evolution of Man*, vol. i. pp. 1-6.

it cover the following?—After repeatedly affirming that the moneron is “a simple lump of albumen,” “one single substance,” “homogeneous matter,” “homogeneously composed of one single substance,” “nothing but a semi-fluid, formless, and simple lump of albumen,” “the simplest of all imaginable organisms”; after asserting that “all distinction of heterogeneous parts is wanting”—he elsewhere affirms, “All animals and all plants, in fact all organisms, consist in great measure of fluid-water.” Then the moneron is neither an animal nor an organism unless it has more than “one single substance.” He affirms: “In its early stages, the human embryo contains ninety per cent of water. . . . Without water there is no life.” If the moneron has any life whatever, it must be composed in part of water; but it is one “single substance.” It is, however, the “primeval parent of all other organisms,” and consequently must have been about ninety per cent water—must at least have had some, for “without water there is no life.” Apparently “the organless organism,” “the simple albuminous lump,” is too simple to have been “the primeval parent of all other organisms.”

The author defines ontogeny as the history of the germ, or the recapitulation, in the embryonic state, of phylogeny, that is, of all the successive changes through which a species has passed in its evolution from primitive ancestors. According to this fundamental ontogenetic law every animal, including man, should begin in its embryonic state in a cytod and successively evolve through all the intermediate links to the particular stage of evolution attained by its species. The links between the first living organism and man are declared to be twenty-two, though the reader finds it impossible to determine the several animal forms assumed by the

human embryo during the period of development. Protracted portions of the history appear totally illegible. Nevertheless, this ontogenetic law is declared to be fundamental—every animal, during its embryonic state, passes through all the changes through which its species passed in its evolution from the primeval parent of all organisms. Strange to say, after half a volume is taken up in the attempt to establish this law, man's history is represented as beginning in a "one-celled organism," and not in a cytod. The argument from ontogeny, which is regarded as original and unanswerable, should have based itself upon irrefragable evidence that all animals begin in a cytod. No, the law is deliberately ignored. Instead of possessing unmistakable testimony that the human embryo, and every other animal embryo, is a moneron in the first stage of its existence, we are confronted with the assertion, "all animals descend originally from a one-celled organism." Of what value is this ontogenetic law in furnishing a recapitulation of phylogeny, if, instead of reproducing the earliest ancestral form it contents itself with beginning in a complex cell? And yet, in subsequent eras, the task of "reproducing, in the course of its own evolution, the most important of the changes in form through which its ancestors . . . have passed in the slow and long course of their palaeontological evolution," seems to have been insufficient to exhaust its energies, leaving it equal to the profitless labor of furnishing the earliest vertebrate animals with large heads in the first stages of embryonic development instead of leaving them headless like their acephalous ancestors. It appears, in subsequent ages, to have possessed power adequate to the *reproduction* in the stages of embryonic development of what had not been previously produced by phylogenetic evolution; for example, the embryonic

tail of the turtle. It had unemployed energy adequate to the task of enabling the shad to reproduce, during the earlier stages of its embryonic unfolding, its own gill-arches. One would naturally suppose that these—as the animal retains them during its existence and must have received them as a part of its legacy from less complex progenitors—would be a later embryonic evolution.

We are expected to believe in ontogenesis and to believe also that the moneron is “the primeval parent of all other organisms.” If we accept the one, we consider ourselves logically forced to reject the other. Still we are asked to believe both, though “where faith begins, science ends.”

How does the phylogenetic law stand related to the venerable head of all living organisms? This fundamental law is that every organic tribe of beings has a phylogeny, or history of its evolution, which history is reproduced by ontogeny, the compressed history of the series of antecedent transmutations. Let us see. The moneron is an organic tribe, extensive, long-lived, and important. It peoples ocean-beds. It has come down to the present. It is declared to be “the primeval parent of all other organisms.” It is an organism, for it has the functions of life. It certainly must have had some kind of history during its evolution from inorganic matter, for evolution is invariably by slow and nearly imperceptible stages. The history must be interesting and would be of importance to science. And yet, strange to say, no effort is made to recount it, though this is the point upon which special attention should have been concentrated. If the first moneron came into being by spontaneous generation, every subsequent moneron ought to have furnished us a brief compressed history of the interesting process. It was evolved. It must have a history. That history ought

to be a recapitulation of the stages through which the first moneron passed in its evolution from inorganica. Why has not the moneron been subjected to rigid microscopic inspection during the period of "self-propagation by division," in order to ascertain this phylogeny? If the changes undergone during this period had been exhibited in charts as the tail and the gill-arches of the human embryo have been, it would perhaps have been possible to perceive the mysterious course pursued by inorganic matter in evolving itself into a living organism. As it is, phylogeny is powerless just where its aid is most needed. The theory would have been strengthened considerably, if instead of representing the ascidian as having developed gills and a rudimentary tail long prior to the existence of fishes, it had simply given us the phylogeny of the moneron. This would have relieved the difficulty which now prevails in determining which forms are prophetic of improvements, and which are recapitulations of stages through which ancestors passed in the process of evolution.

Numerous as are the difficulties which connect themselves with Haeckel's description of the moneron as related to statements found elsewhere in his works, and formidable as are the objections to his theory founded upon the extreme simplicity of this structureless organization, we are confronted with still graver difficulties when we undertake to evolve "all other organisms from it." Being of "one single substance," how could it produce variations? If it had been described as a gaseous substance we might have believed it capable of combining by chemical affinity with other substances, and so differentiating. If organs had been assigned to it we might have concluded that slight variations were possible. If instead of being characterized as "a simple album-

inous lump," it had been pronounced "a chemical combination," the difficulties would have been less serious. How "one organless substance" could have produced the changes characteristic of evolution, it is difficult to see. Were the variations spontaneous? The only spontaneous variation conceivable in "a semi-fluid, formless, and simple lump of albumen" is its separation into homogeneous parts, like the division of a crystal. This, however, would not aid in the development of higher forms.

Even if variations could have arisen, how could they have been transmitted when propagation was by self-division? Any improvement must have been divided, half being retained by the parent and half transmitted to the child. Half an organ, for instance, half an intestinal canal, would have been valueless, and must soon have been eliminated from the creature's system as a useless burden, leaving its descendants to begin *ab initio*, as its progenitor did. If it is said that, strictly speaking, the moneron does not divide itself but develops another moneron out of its own body; then we reply, it is not, as asserted, "the simplest imaginable organism," nor even the simplest observed organism, for there are worms whose number may be multiplied by simply cutting them into pieces, each piece becoming as perfect as the undivided parent. Accordingly, how "the simplest imaginable organism" which propagates itself by self-division can transmit improvements, even supposing it capable of acquiring them, is what evolutionists ought to have made clearer. Acquired advantages, we are told, are transmitted by inheritance; but to the uninitiated, it looks like a misapplication of the term "inheritance" to say that the piece, which may be cut from the center of a worm, inherited from its ancestor a head and a tail. It has neither.

The exertions of the moneron to produce variations could scarcely have been aided by the struggle for existence, for with the entire earth for a home and no living organisms as competitors, the struggle for existence could not have been very intense, certainly not as intense as now when monera, though numerous, fail in producing the slightest variations. Nor could survival of the fittest have aided in evolving improvements; for, even supposing there was an appreciable difference between the fittest and the least fit, the latter surely could survive if the first moneron did, since, by supposition, nothing could have been less adapted to survive than "a semi-fluid, formless, and simple lump of albumen." Certainly sexual selection could not have rendered assistance, for the little puzzle was bisexual. What then could have caused variations? If an adequate cause existed, why has it ceased to operate, leaving present monera powerless towards producing even the slightest improvements?

In passing, we may note another difficulty, the continuance of unimproved monera to the present day. Darwin tells us: "New and improved varieties will inevitably supplant and exterminate the older." Here is an insolvable enigma; unimproved and unimprovable monera still exist. By the law of evolution they should have been exterminated tens of millions of years since, or should have been taught to improve. They have had time sufficient to become either elephants or archangels. They do nothing, and still live. It thus seems that evolution, the most potent sovereign in the universe, has to succumb to the moneron. It cannot exterminate the creature, nor cause it to vary in the smallest measure, though from its ancient ancestor it evolved a Sir Isaac Newton.

To return: neither could this power of improvement have been inherent in the moneron, for, as we have just said, this "simplest of all imaginable organisms" still lives; which is conclusive evidence that it did not possess innate powers of preserving increments of advance. If it had possessed this power, if there had been advances, however slight, by this time it would have possessed an eye, an ear, an intestinal canal—would have been a creature more advanced than "a being homogeneously composed of one single substance," "nothing but a semi-fluid albuminous lump," "a homogeneous atom of plasson." Had it improved its innate powers, it might have been a fish, or a kangaroo, certainly might have been a mosquito.

Supposing that in some inexplicable manner the ancient moneron, unlike its successors, did manage to vary could it have preserved the increments of improvement? We answer, No; for Darwin assures us,

"Monstrosities cannot be separated by any distinct line from slight variations."—*Origin of Species*, p. 6. Again: "Without separation a single monstrous variation would almost certainly be soon obliterated."—*Variations of Animals and Plants*, vol. ii. p. 495.

Evidently, then, the variation of the primeval moneron could not have been a monstrosity—it would have been almost certainly obliterated. But if natural selection cannot preserve marked modifications, how can it preserve slight variations? As a monstrosity is only an augmented variation, how does it happen that instead of having greater power of perpetuating itself it actually has less? If, as Darwin says, "monstrosities cannot be separated by any distinct line from slight variations," and if monstrosities are "almost certainly obliterated," then slight variations are as much more likely to be obliterated as the structural changes are less marked than those in monstrosities.

With the design, apparently, of making the theory easier of acceptance it is affirmed that not all monera improved at the time higher forms branched off, but that at one time and in one place, one moneron, and only one, improved, leaving descendants which carried forwards the improvements till they culminated in a more complex form. Is it rational to believe that if variation is possible it could only occur at one time, and only in one place, and only in the case of one moneron? If such a change was possible once, then, however improbable its recurrence might be, it ought not to be pronounced impossible. If it occurred once, it might have occurred oftener. If it could not occur a second time, then it is safe to say it could not have occurred the first time. If the process cannot repeat itself, it must be because there is an infinite number of chances against its recurrence; but there must have been the same number of chances against its occurrence. Consequently, the origin of all forms of life higher than the moneron was once suspended upon this shadowy contingency, equal to an impossibility. If the requisite variation could have occurred but once, then the existence of the entire animal kingdom, including man, is the purest accident conceivable. The strangest part of all is, that this creature which blundered so egregiously—in violating all law by doing what no other moneron ever has done, or ever can do—neither unfitted itself for its environment, nor lost its increments of improvement, but was fortunate enough, after its blunder, to retain all acquired advantages till it evolved male and female issue, which neither reverted to ancestral forms nor lost successive advances by inter-crossing. Strange; for we are assured that the variations of single individuals are inevitably and speedily obliterated by the mere force of the number of unimproved individuals, unless the

improved varieties are kept separate and so induced to breed *inter se*.

By commencing the process of evolution in a bisexual organism, Haeckel evinced wisdom, for in that class of animals an individual might improve without having the improvements eliminated by the influence of unimproved specimens; but a time must come when improvements could only have occurred by the advance of the entire species, or at least of all inhabiting a particular locality—the individuals being unisexual.

If there were slight advances in a few monera, and if these advances endured for a time, still the chances that these would be lost, before they were transmitted to the next higher order, must have been millions to one; and in each succeeding stride to the next species above—and the number of species is countless—there must also have been millions of chances of losing the increments of improvement ere the higher form was evolved, against one chance of retaining them. Nay, according to evolution, which denies the fixedness of species, the improvements could never have reached a point at which they were secure against retrogression. Consequently, there must have been an infinite number of chances, on this count alone, against one chance that improvements could be preserved "till man was evolved." Accordingly, against the assumption that a moneron could have been evolved into a Haeckel we have millions of chances, multiplied by the long line of figures designating the number of marked varieties between the "homogeneous atom" and man.

He who can believe that man evolved from a moneron, and a moneron evolved from matter, and matter evolved from space, ought not to object to the doctrine of a Personal God. If from nothingness it is impossible that

anything should be created by an Intelligent Being possessing omnipotence, then from nothingness it is impossible that anything should be created by evolution. In its ultimate findings, logic seems to require us to believe, either that matter is eternal and omnipotent, or that there is an Intelligent Personality self-existent in essence and infinite in power. A majority of the human family regard the latter proposition as more reasonable than the former. Some theists, it is true, are disposed to ask, How could even an Omnipotent Intelligence create a universe from nothingness? They prefer to regard everything as an emanation from God—the material universe, His outer garment; life, a quivering drop of His own personality; spirit, the effluence of His being. Others content themselves with the dictum: God exists; everything external to Him owes its being and its continuance to His Unconditional Will. One and all, when conscious of the overshadowing presence of The Eternal, throw down the weapons of reason, and walking softly reverently whisper: The Unfathomable is; bow the knee in worship.

CHAPTER X.

ABIOTGENESIS.

HAVING endeavored to show that neither the moneron nor a few primordial germs could have evolved the animal kingdom as it now exists, we desire to direct the reader's attention to some of the difficulties connected with the assumption that life originated in spontaneous generation. We make no attempt to prove that it did not so originate, since that would be to undertake the impossible task of proving a negative; but we hope to present evidence sufficient to make it apparent to any unbiased investigator that the theory is a simple assumption having nothing for its support except the necessity—keenly felt by atheistic evolutionists—of possessing a living organism spontaneously generated. Professor Huxley frankly admits that the exigencies of his theory furnish the only available testimony in favor of abiogenesis, or the origination of the living from the not-living.

He says:—

“The course of modern investigation has distinctly tended to disprove the occurrence of equivocal generation, or abiogenesis, in the present course of nature. . . . The evidence is yet to be adduced which will satisfy any cautious reasoner that ‘omne vivum ex vivo’ is not as well established a law of the existing course of nature as ‘omne ovum ex ovo.’”—*Encyc. Brit.*, art., “Evolution.” “The fact is that at the present moment there is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which the existence of life on the globe is recorded. But it need hardly be pointed out, that the fact does not in the

slightest degree interfere with any conclusion that may be arrived at deductively from other considerations, that at some time or other, abiogenesis must have taken place. . . . If the hypothesis of evolution is true, living matter must have arisen from not-living matter; for by the hypothesis, the condition of the globe was at one time such that living matter could not have existed in it, life being entirely incompatible with the gaseous state. But living matter once originated, there is no necessity for another origination, since the hypothesis postulates the unlimited, though perhaps not indefinite, modifiability of such matter. . . . Of the causes which have led to the origination of living matter, then, it may be said that we know absolutely nothing. . . . The present state of knowledge furnishes us with no link between the living and the not-living."

—*Encyc. Brit.*, art., "Biology."

It thus appears that a torturing necessity, begotten in the determination to eliminate God from the universe, is the main, if not the only, proof which evolution can furnish that life is a result of spontaneous generation. The entire argument may be compressed into this brief assertion,—consistency seems to demand it, for a starting-point is indispensable, "If the hypothesis of evolution is true, living matter must have arisen from not-living matter." But alas, for the theory, "there is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which the existence of life on the globe is recorded." Then there is very little evidence that "the hypothesis of evolution is true." Why cling so tenaciously to a theory which can only be true, provided a miracle has occurred of which there is confessedly no evidence whatever; and against which, moreover, the unvarying uniformity of nature's laws, "within the period during which the existence of life on the globe is recorded," enters its determined protest? Why do advanced evolutionists, while spitefully insisting that the uniformity of nature's laws renders it impossible to believe in the miracles of Scripture, still persist in asserting that "abiogenesis," the greatest of miracles, "must

have taken place," though of testimony there is absolutely none?

"But living matter once originated, there is no necessity for another origination." Why? Because, "the hypothesis postulates the unlimited, though perhaps not indefinite, modifiability of such matter." If all that is necessary is to have some hypothesis that will "postulate unlimited modifiability" why not at once fairly meet the demands of the case and squarely assert the "unlimited, though perhaps not indefinite, modifiability of such matter" as is denominated inorganic? By asserting that it could modify itself to an "unlimited" extent provision would be made for man's advent upon the stage; and by saying, very guardedly, perhaps inorganic matter cannot modify itself to an "indefinite" extent, we would be given to understand that its myriad attempts at "modification" could never result in producing monstrosities, but of course could easily originate a moneron, an amoeba, a cytod, a homogeneous atom of plasson. This would render "the hypothesis of evolution" quite consistent throughout; for as the subsequent transmutations, which are accounted for by saying the hypothesis "postulates" them, are regarded as spontaneous—there being no intelligent designer and no secondary causes to which they can be attributed—it will of course be quite easy and entirely consistent to affirm that it requires no more faith to believe that animal organisms originated in spontaneous generation than to believe that man evolved himself from anthropoid apes. If apes possessing "unlimited modifiability" generated man through numberless transitional forms, all of which have perished, then manifestly an atom of earth possessing "unlimited modifiability" may have spontaneously generated a moneron, especially as it enjoyed an

eternity in which to try, and may have been kept from blundering because its "modifiability was perhaps not indefinite." As there could be no transitional forms between the living and the not-living, one difficulty connected with subsequent transmutations would not cause embarrassment. Of course no intermediate forms would be expected to exist.

"If the hypothesis of evolution is true, living matter must have arisen from not-living matter." "There is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which life on the globe is recorded."

"At some time or other abiogenesis must have taken place."

"Evolution postulates the unlimited, though perhaps not indefinite, modifiability of living matter."

The argument here outlined, when presented in syllogistic form, is as follows:—

1. If evolution is true, abiogenesis must have occurred at some time;

2. Evolution may be true;

Therefore, Abiogenesis may have occurred.

The premises will warrant no stronger conclusion. The inference may be no broader than the narrowest statement contained in either premise.

To appearances, the argument comes so near affirming, abiogenesis is true because evolution is true, and evolution is true because abiogenesis is true, that it might legitimately assume the following form:—

1. Unless abiogenesis has occurred, evolution cannot be true;

2. "There is no shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which life on the globe is recorded";

Therefore, There is no trustworthy direct evidence that evolution does take place, or has taken place, etc.

If evolution is at liberty to draw conclusions suited to its demands, why may not its opponents do so also? Logic, with its rules in reference to negative premises, undistributed middle, illicit process, an affirmative conclusion when one of the premises is negative, a universal conclusion when one premise is particular, etc., is no more binding upon opposers of evolution than upon evolutionists.

The argument may be made to assume form as follows:—

1. If evolution is true, living matter must have arisen from not-living matter;
2. Evolution is true, for it postulates “the unlimited modifiability of living matter”;

Therefore, Living matter has arisen by spontaneous generation from inorganic matter. Has the “unlimited modifiability of such matter” been proved?

The reasoning might assume this syllogistic form:—

1. Whatever postulates “the unlimited modifiability of matter” is true;
2. Evolution postulates “the unlimited modifiability of matter”;

Therefore, Evolution is true.

1. If evolution is true, abiogenesis must be true;
2. Evolution is true;

Therefore, Abiogenesis is true.

Presented in this dress, effort might have been concentrated upon the establishment of the first premise in each syllogism.

To complete the reasoning this might be added:—

1. Whatever the theory of evolution needs for its establishment must have occurred, either since the origin of life on the globe or antecedent thereto;

2. Abiogenesis, of which “there is not a shadow of

trustworthy direct evidence that it does take place, or has taken place, within the period during which the existence of life on the globe is recorded," is necessary to the establishment of the theory of evolution;

Therefore, Abiogenesis must have taken place prior to "the period during which the existence of life on the globe is recorded."

If we have failed to prove that the not-living gave birth to the living, or if we have tripped in our effort to show that this miracle occurred ere the present order of things was introduced, it is not because we have neglected to place the argument in the clearest light which it seems capable of enduring.

Is it conceivable that a living organism, the primeval parent of all other organisms, came into being by a fortuitous aggregation of material elements? We answer, No: for it is extremely improbable that the constituent elements of a vegetable or animal germ, of a moneron or a lichen, as the case may be, could have come together spontaneously. Professor Huxley informs us that "germs consist of at fewest four elementary bodies; viz., carbon, hydrogen, oxygen, and nitrogen, united in the ill-defined compound known as proteine, and associated with much water and very generally with sulphur and phosphorus in minute proportions." Professor Haeckel assures us that the moneron, the primitive parent of the entire animal kingdom, has the same constituent elements. Then we are to believe that these several material elements came together "spontaneously," and that they came together in precisely the requisite proportions. Even this, however, though a miracle, would not account for the origin of life, for there are dead monera and lifeless germs. It has not been shown that these differ in material constitution from those possessing life. It is

conceded that the above-mentioned material elements may combine without constituting a living organism. Something more is requisite,—life. If, with the view of rendering the work of spontaneous generation as easy as possible, we regard life as simply a particular arrangement of material molecules we are required to believe that these molecules "spontaneously" arranged themselves in such a manner as to originate life; and as all the varied forms of life must be due, according to the conditions of this hypothesis, to distinct molecular arrangements we are further forced to believe that these molecules so arranged themselves, "spontaneously," as to originate the lowest imaginable organism, a moneron, a lichen, an animal germ, a vegetable germ, or a germ capable of evolving vegetable and animal organisms. Did these three things,—the material aggregation, the molecular arrangement requisite to constitute life, and the specific arrangement necessary to the origination of "the lowest imaginable organism"—concur "spontaneously," being brought about concurrently by unknown forces inherent in these constituent elements? This requires a large measure of credulity, especially as science is vigorously asserting, and has been for more than twenty years, that since the dawn of terrestrial history no material atom has been destroyed, and no force has been annihilated.

And yet, strange to say, it is frankly conceded that spontaneous generation does not now occur, cannot now occur, and has occurred but once. Are we to understand then that spontaneous generation is causeless generation? If it is not causeless, why has it occurred but once? The cause which produced it that once still lives, for no force has been annihilated. To say that it was causeless would be unscientific. To concede that we are to understand "the spontaneous

origination" of life as its origination through unknown causes, is to confess carelessness in the choice of language. Besides, it would not answer the purpose of atheistic evolution; for it would leave its advocates liable to be inflicted with a text of Scripture from the mouth of some modern Paul: "The unknown God, whom ye ignorantly worship, Him declare I unto you."

If spontaneous generation is inconceivable even on the theory that life is merely a particular molecular arrangement, it is of course no less inconceivable on any higher theory of life. If life is a directing agency capable of organizing matter into a living structure, then how came "the ill-defined compound known as proteine" to possess this directing agency? How did it happen to become so well fitted to be the primeval parent of all living organisms? Whence came this directing agency? Why did it evolve but one ancestral form? Was it evolved "spontaneously"? Did it come into existence independently of the material elements constituting the body of the first living organism? If it did, what produced it, and what associated it with the albuminous lump? And when associated, why did it happen to constitute or to develop into a homogeneous atom of plasson? It was protoplasm, and protoplasm can develop into an elephant or a cedar, as well as into "the lowest imaginable organism." Did the undifferentiated lump develop a directing agency through forces inherent in itself?—and is it enough to say that it could as readily develop the directing agency characteristic of a moneron or a lichen as it could develop the life-principle of a tiger or of a mammoth pine? But some cause must have produced the specific result. That cause, or combination of causes, must have been different, in slight measure at least, from any cause or combination of causes which was

fitted to the production of a different effect. It is unscientific for the evolutionists to say that the homogeneous atom, while still mere matter, can and must proceed to develop the life-principle, unless they are prepared to tell us how it can and why it must. In what does this power reside? What necessity impels this spontaneous generation? Those who persist in denouncing the hypothesis of an uncreated First Cause, do not expect us to believe that this effect has no cause.

Again: if we are to view life as an intangible, immaterial entity, a substance though not matter, then we are forced to inquire whether it originated simultaneously with the aggregated material elements of the creature's minute body or came into being independent of it. In the former case there must have been two acts of spontaneity; in the latter case there must have been three,—the generation of the material in proper proportions, the generation of the immaterial entity, and the union of the two. It thus becomes evident that spontaneous generation is inexplicable whatever we may choose to regard life, whether as molecular arrangement, an organizing principle, or an entitive substance. In every conceivable aspect of the case it is a mindless, willess, blind, groping nondescript, with no powers at its command; and yet it is supposed to have produced a result in comparison with which the results of human intelligence seem destitute of design.

It may perhaps be said that injustice is done to the theory in question by assuming that the term "spontaneous," as employed in this connection, may be interpreted as meaning *causeless*. We candidly concede that this is neither its etymological nor its commonly accepted meaning, and yet, if life is the "spontaneous" result of the internal forces of nature, unassisted by any extra-

mundane force, it is remarkable that it has not occurred during man's history, and cannot be produced in the laboratory. If it occurred but once, and occurred without the intervention of a Personal Will, it would seem as if it must have been causeless. What unassisted nature has done once, it can do again, for its internal impulses remain unchanged. What it does once, it generally does quite frequently, for the causes which combine to produce one effect are likely to combine in the production of other similar effects. What force of nature, or what concurrence of forces, can be shown to have operated once and then lapsed into perpetual quiescence? Certainly the term "spontaneous," as ordinarily employed, does not bear this meaning. Spontaneous combustion does not mean combustion which has occurred but once and "can never occur again." Such combustion we should be disposed to denominate "causeless"; for if it were not, but was effected by agencies resident in nature, it might occur again. The causes which produced it, however complicated, and though undiscoverable by man, might come into operation a second time during the lapse of hundreds of millions of years. But we are told that spontaneous generation has occurred but once, and can never occur again. Then life is the result of a blunder on the part of nature; and yet all nature is fitted to it, and it is fitted to nature. If then spontaneous generation is an act incapable of repetition, is it unreasonable to recommend the substitution of "causeless" for "spontaneous"?

Are we then to understand that the term "spontaneous" is employed because the first living organism originated in unknown causes? Were its material elements brought together in proper proportions by some undiscoverable force or forces? Was the "albuminous lump"

subjected to the influence of heat, electricity, light, magnetism, chemical affinity? Were all changes affected by external agencies? Was light, acting upon the homogeneous protoplasm, converted by absorption into heat, which in turn produced electricity, magnetism, chemical affinity, motion—all the forces of nature, any one being convertible into any other? It is perhaps said that these agencies may have originated the first living organism, either a plant or an animal; and that we may properly designate the process "spontaneous" because we are unable to determine which was the initial energy, into what it was subsequently transmuted, what potency belonged to the several co-operating agencies, and whether they could ever again combine to produce a similar result.

If we are asked to view the case in this light, we may pertinently inquire whether it is not improbable that these energies should have chanced to operate once in the production of an effect which is without a parallel? Against the assumption that they so combined we have the unbroken testimony of the ages. The laws of nature, which are uniform in their operation, have persistently refused to repeat the process. Nor have we any human testimony, that *vivum ex vivo est* is not a law of the universe, one which has never been violated. There is no evidence that any animal originated from inorganic nature, either "causeless," or from the operation of causes inherent in matter. There is unvarying testimony extending through millions of years, that life has invariably originated in an antecedent individual life. Why, then, should some scientists, while rejecting miracles and assuring us that they are at variance with the uniform testimony of experience, still persist in asking us to believe the most stupendous miracle ever presented for man's acceptance?

They request us to believe, without any evidence whatever, that life originated spontaneously.

If no evidence is presented that spontaneous generation has ever taken place; if it has not occurred since man's advent upon earth; if for untold millions of years the forces of nature have been operating in undisturbed potency over extensive areas without leaving any evidence whatever which tends to confirm the conjecture that the living may have arisen from the not-living; if no one is able to prove that unassisted nature possesses powers adequate to the task of originating life; if no scientist is able to say, "I saw a cytod which never had an ancestor,"—then why should we be expected to believe a miracle which is as much less credible than those of Scripture as the baseless hypothesis that the earth rests upon a huge serpent is less credible than the theory which has displaced it?

The improbability that life had its origin in spontaneous generation is greatly increased by the fact that scientists, though striving earnestly for years, have failed in producing it from inorganic matter, or even from organic substances which have been subjected to sufficient heat to destroy all the germs. If life is a particular arrangement of the molecules of ordinary matter—indeed, whatever it may be, if it has come and consequently can come into being "spontaneously"—scientists ought long since to have presented us with at least one throbbing moneron, one living germ, one little lump of palpitating proteine, one quickened atom of plasson, the production of the chemical laboratory. Chemistry has no living children. Strange! Let them originate a living moneron, "the lowest imaginable organism" (except the cytod, which is "lower" than the lowest), and they will accomplish more towards the acceptance of their

theory than by voluminous, unsatisfactory, and confusing reasoning.*

The extent to which meats and vegetables are preserved by the process of "canning" is satisfactory evidence that those experimenters are mistaken who imagine that they have discovered bacteria in flasks which, containing organic substances, have been sufficiently heated to destroy all germ-life and subsequently rendered air-tight and allowed to remain a few days. Either the heat must have been insufficient to destroy germs of bacteria, or there were no bacteria when the flasks were opened, or they came from the enveloping atmosphere as the contents of the flasks were under examination. If bacteria, or indeed any other form of either vegetable or animal life, can originate where no living germs exist, why are meats, fruits, and vegetables preserved by "canning"? The presence of life in these cans would cause decomposition, the contents becoming valueless. All germs are either expelled by driving out the

* H. Charlton Bastian, M. D., F. R. S., made the following experiment:—A strong solution of turnip was rendered faintly alkaline: to this was added a few muscular fibers of cod-fish. The mixture was then put into a flask, the neck of which was hermetically sealed by a blow-pipe flame while the contents were at the boiling point. It was subsequently introduced into a digester which was gradually heated to a temperature of from 270 degrees to 275 degrees F., and kept at the same degree of heat for twenty minutes. The flask, when drawn from the digester, was kept for eight weeks at a temperature of from 70 degrees to 80 degrees F. When opened, it was found to contain bacteria of most diverse shapes and sizes—also nucleated spire-like bodies. A similar experiment with common cress yielded minute and delicate protomœbae varying in size and creeping with moderately rapid slug-like movements—also bacteria, protoplasm, motionless and tailless sperules of different sizes, and active monads of one-four-thousandth of an inch in diameter. It should be noted that organic matter was employed, not inorganic; nor has it been conclusively proved that the amount of heat, great as it was, to which the mixture was subjected, is destructive of all living organisms. The experiments, it is conceded, were inconclusive.

air, or they are destroyed. Consequently, the contents are preserved. If lower forms of life could originate "spontaneously" in the air-tight vessel, its contents would be rendered worthless. Some cans "spoil," it is true; but this, as is well known, is due either to imperfect sealing, to air left in the cans at the time they are closed, or to insufficient heat in the process of preparation.

It is not possible to attribute the preservation of the contents of properly sealed and well-boiled cans to the exclusion of oxygen, for it has been proved that the presence of oxygen is not necessary for either fermentation or putrefaction. It cannot be attributed to the fact that the contents were well boiled, for boiled fruits, meats, and vegetables are fermentable and putrescible. Nor is their preservation due to the exclusion of air, for these substances can ferment *in vacuo*. It cannot be said that bacteria fail to manifest their presence simply because there is no air in which they may live, for bacteria can live without air. What reason, then, can be assigned except the expulsion or destruction of germs?

The proposition that living matter may arise from that which has no life—"abiogenesis"—has not been proved. The dictum of Redi: "omne vivum ex vivo," "all life from pre-existing life"—"biogenesis"—is still entitled to respect. Until it has been proved that in one instance at least life has originated without the agency of pre-existing life it is premature, and unscientific, to regard spontaneous generation as anything else than a baseless speculation.

That under the manipulations of the most eminent chemists, as Buffon, Needham, and Bastian, it has not been proved that life may, or has, proceeded from lifeless

matter, is frankly conceded by Mr. Huxley. Buffon and Needham maintained that in beef and hay, both dead matter, there were "organic molecules" which were capable of originating life if subjected to the influence of water. These molecules, having the property of life and existing in all living things, and possessing energies distinguishing them from dead matter, were supposed to be equal to the task of producing animalcules, *i. e.*, life under new forms, xenogenesis. Certainly such living things exist in decaying animal and vegetable substances. They are also exceedingly small, the diameter of some being not more than $\frac{1}{40000}$ of an inch. What is their origin? Spallanzani triumphantly proved that if these substances were sufficiently heated and the air successfully excluded, no animalcules made their appearance. It was then imagined that the action of oxygen on these "organic molecules" was necessary to develop vitality. This theory shared the fate of its predecessor. It was found that air which had been passed through red-hot glass tubes—its quality remaining unchanged though the living germs it contained were destroyed—might come in contact with dead organic matter for an indefinite period of time and no living thing resulted. The same result has attended the various experiments made with air which has been strained through cotton-wool. If the mouth of the vessel, which contains an infusion fitted for the development of living things, is closed with cotton-wool while heated, no life manifests itself. Indeed, the mouth may be left open, if the neck of the flask is long and turned downwards. The germs of life, of which the air is full, cannot fall upwards.

Mr. Huxley's summary of the result of the many experiments made with a view of solving the question of abiogenesis is as follows:—

" It is demonstrable that a fluid eminently fit for the development of the lowest forms of life, but which contains neither germs nor any proteine compound, gives rise to living things in great abundance if it is exposed to ordinary air, while no such development takes place if the air with which it is in contact is mechanically freed from the solid particles which ordinarily float in it and which may be made visible by appropriate means."

" It is demonstrable that inoculation of the experimental fluid with a drop of liquid known to contain living particles gives rise to the same phenomena as exposure to unpurified air."

" It is further certain that these living particles are so minute that the assumption of their suspension in ordinary air presents not the slightest difficulty."

" Thus the evidence, direct and indirect, in favor of biogenesis, for all known forms of life, must, I think, be admitted to be of great weight."

" If the results of the experiments I refer to [hermetically sealed fluids, after exposure to heat, yielding living forms of organization] are really trustworthy, it by no means follows that abiogenesis [life without the agency of pre-existing life] has taken place. The resistance of living matter to heat is known to vary within considerable limits, and to depend, to some extent, upon the chemical and physical qualities of the surrounding medium. But, if, in the present state of science, the alternative is offered us, either germs can stand a greater heat than has been supposed, or the molecules of dead matter, for no valid or intelligible reason that is assigned, are able to rearrange themselves into living bodies, exactly such as can be demonstrated to be frequently produced in another way, I cannot understand how choice can be, even for a moment, doubtful."

" I see no reason for believing that the feat [the production of life from non-living matter] has been performed yet."

" The doctrine of biogenesis [*omne vivum ex vivo*] appears to me . . . to be victorious along the whole line at the present day."—*Lay Sermons*, pp. 363, 364, 365, 366, 367.

But it may be said that we ought not to conclude that spontaneous generation was impossible in former times, because it is apparently impossible now. We are told that there were causes in operation then which do not exist now.

We answer: It is a purely gratuitous assumption that at the dawn of life upon the earth forces were operative that have since been either annihilated or rendered less potent. Nature is uniform. Her laws are the same in all eras. We are assured by scientists that no force has been

annihilated, or indeed can be. If energies existed anciently which have ceased to operate since, evolutionists, we presume, ought to be able to determine their nature, in measure at least, by an examination of those still existing, which, if evolution is what it is represented to be, must have been evolved from those which have perished. Forces, it is true, are convertible; but they are not destructible. Consequently, if any existed anciently which do not exist now, they must have disappeared through transformation. Accordingly, those who are able to trace man back to the moneron ought to be able to trace the genealogy of existing forces, and to explain why, contrary to the analogy of the vegetable and the animal kingdom, there has been degeneracy instead of improvement. Why have physical causes become less potent by the lapse of time, whilst vital causes have greatly increased in power? Why did the moneron go on improving till man was evolved, whilst the agency or agencies which originated it have so far deteriorated that they are unequal to the task of producing a second "homogeneous atom of plasson"?

Are light, heat, electricity, magnetism, and chemical affinity lineal descendants of forces that have passed away? Was there originally but one force, motion, as there was but one animal, the little "organless organization"? Were all potencies but modes of operation of this one force? Was this one energy more potent anciently than at present? No: for we are assured that force cannot be annihilated; and its diminution ought to be regarded as a partial destruction. If it is said that a particular energy may be diminished without the annihilation of the part that disappeared, we answer, Certainly, for it may assume a new form. There is no less force in the world on that account. When motion is diminished

by friction, heat is increased to an extent which may be measured by the amount of motion lost. Light may be converted by absorption into heat. Electricity may be transformed into magnetism, etc. But if the sum-total of the forces operating in nature has been diminished since the dawn of life, there has been an annihilation of force, which science has pronounced a thing impossible.

It is safe to affirm that the preponderance of testimony is in favor of the theory that the forces now operative in nature are as potent as those which operated millions of years before the molecules of matter assumed that peculiar arrangement which resulted in the gradual evolution of "evolution"; as potential as those which ruled the universe at the time this "albuminous atom" leaped into life. It is perhaps said that forces existent now may have operated anciently under modes unknown at present, or may have constituted a single force, or may have combined as they combine no longer. Such conjectures are possible, it is true; and effects diverse from those witnessed now may have resulted: but it has not been proved that the physical forces are independent concomitants of matter; that, given the existence of the latter, the former could have been different from what they are; that animate and inanimate nature may be influenced by agencies not now in existence. It has not been shown that conditions existed in ancient times more favorable to the origination of life, nor that matter then possessed powers which have since been lost. The earth, it is true, formerly existed under conditions different from those which prevail now. Cosmical causes have produced cosmical changes. These, however, are supposed to be confined to a succession of tropical and glacial eras—more anciently "to a continued diminution of heat." Neither heat nor cold, however, has aided abiogenists

in originating life. Life is from pre-existing life—such is the testimony of science.

Professor Haeckel, apparently with the view of rendering it easier to accept the theory that life originated in spontaneous generation, assures us that,—

“ We can even positively and with full assurance maintain that the conditions of life in primeval times must have been entirely different from those of the present time. . . . How can we know that in remote primeval times there did not exist conditions quite different from those at present obtaining, and which may have rendered spontaneous generation possible? ”—*History of Creation*, vol. i. pp. 341, 342.

If “ the conditions were entirely different from those of the present time,” then the living things which existed must have been entirely different from those which have existed since, for, as is conceded, very slight changes would suffice to destroy all the life at present upon the earth. Were the conditions of life, at the time the moneron leaped into being by spontaneous generation, “entirely different from those of the present time”? No: for Professor Haeckel obtained monera, lineal descendants of the “primeval parent of all living organisms.” The conditions of life, therefore, cannot now be “entirely different” from those which prevailed in primeval times, but must be, if not “entirely,” then at least essentially, the same. Darwin affirms, “ Some groups [of mollusks] . . . have endured from the earliest known dawn of life to the present day.”—*Origin of Species*, p. 239.

What, then, becomes of this assumption that the conditions of life have greatly changed since primeval periods? Suppose we concede that in primeval eras the condition of the world was very different from what it now is, and that it can be shown that animate organisms lived under conditions exceedingly diverse from those prevailing now—a difficult thing to do,—still it remains

to prove that the life which then existed was capable of perpetuating itself, under incessantly varying conditions, through an almost infinite series of changes down to the present, and actually so perpetuated itself. Unless this is done no scientific explanation of life as it now exists on the globe has been furnished.

But Professor Haeckel, hoping to aid us in deeming spontaneous generation credible, proffers this advice:—

“ Think of the enormous masses of carbon which we now find deposited in the primary coal mountains . . . At that time, under conditions quite different from those of to-day, a spontaneous generation, which now is perhaps no longer possible, may have taken place.”

Yes, we think of the carboniferous period; and we think it existed millions of years subsequent to the assumed origin of life by spontaneous generation. Consequently, we think that carbon, at least the carbon whose “enormous masses we now find deposited in mountains,” could not have been the agency through which the primeval moneron acquired vitality. We even think that upon reflection Professor Haeckel himself thinks so, certainly he informs us that “the era of the tangled forests comprises the immense period from the first spontaneous generation . . . to the end of the silurian system of deposits.” This, which he pronounces “an immeasurable space of time,” “much longer than all the other four epochs taken together,” actually elasped ere the carbon age began. We think his advice does not aid us in accepting his theory.

He also affirms, what we are prepared to concede, that “the impossibility of such a process [spontaneous generation] can, in fact, never be proved.” We also can make statements, and devise theories, and indulge in speculations, and construct hypotheses, “the impossibility of which can, in fact, never be proved.” We assert: God

created the first moneron. No one can prove "the impossibility of such a process." We offer a new theory: The first moneron was the deteriorated descendant of a fallen archangel, who, after his lapse into moral sin, was forced by the inexorable laws of nature to evolve downward till he could degenerate no further without suffering annihilation; thenceforth, he was permitted to evolve upward, and, having already succeeded in reaching the estate of man, is inspired with the hope that after millenniums of ages he may recover his primeval glory. "The impossibility of such a process can, in fact, never be proved." We can even speculate in reference to the moneron, whose existence has so troubled scientists. It was let down to the earth from the moon by a spider's web, at a time when the conditions of life and the laws of gravitation were "entirely different" from what they now are. "At that time," this spontaneous descent, "which is now perhaps no longer possible, may have taken place." Can an evolutionist prove the impossibility of such a process. Our hypothesis is that some abiogenists have been dealing so long with minute forms of life, and have become so desirous of proving that "the lowest imaginable organism" evolved spontaneously from lifeless matter, that the smallest argument assumes importance under their microscopic inspection.

If it shall be proved that abiogenesis is credible, it will still be competent for the teleologist to affirm: God is not eliminated from the problem. Until it is shown that the molecular arrangement constituting life is not an expression of the Divine will, ample basis remains for the assertion: Its origination in this way may have been a part of the original plan. Atheism will find it difficult to substantiate its oft repeated claim.

Evolutionists have made some damaging admissions:—

Prof. W. Stanley Jevons has said:

"I cannot for a moment admit that the theory of evolution will alter our theological ideas. . . . I believe that the eye was gradually developed; but the ultimate result must have been contained in the aggregate of causes; and these, as far as we can see, were subject to the arbitrary choice of the Creator."—*Principles of Science*, vol. ii. pp. 461, 462.

Prof. Haeckel acknowledges:

"Most naturalists of the present day are inclined to give up the attempt at explanation of the genesis of life, and take refuge in the miracle of inconceivable creation."—*History of Creation*, vol. i. p. 327.

Again:

"The theory that man has developed out of lower, and in the first place out of ape-like animals, is a deductive law."—*History of Creation*, vol. ii. p. 357.

So also is the theory that he has developed from inert matter by spontaneity. This age, however, demands a careful generalization from well ascertained facts, and will not be satisfied with an endeavor to determine facts, especially in the domain of science, by an *a priori* process of reasoning.

As we have already seen, Prof. Huxley concedes:

"If the hypothesis of evolution is true, living matter must have arisen from not-living matter."

Spontaneous generation must have occurred, therefore, or evolution is a baseless fabric.

But he frankly admits:

"The present state of knowledge furnishes us with no link between the living and the not-living, . . . there is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which the existence of life on the globe is recorded."

Then the theory of evolution rests on an insecure foundation.

We close with two brief quotations:—

Prof. Joseph Cook says very justly:

"The chasm between the not-living and the living forms of matter is the fathomless abyss at the rugged edge of which every traveler on atheistic or agnostic roads at last lifts his foot over thin air." —*Biology*, p. 41.

Prof. Heinrich Frey says:

"A deep abyss separates the inorganic from the organic, the inanimate from the animate . . . Is it possible, then, to bridge over this gulf? We answer: No, at the present time."

CHAPTER XI.

MATTER; ITS ESSENCE.

HAVING aided the reader, as is hoped, in entertaining the conviction that the origin of man, of plants, and of animals, necessitates belief in the existence of an Intelligent First Cause—even though one concedes that evolution may have taken place in these three provinces—we enter upon a more extended theme: *Matter; its essence, its properties, its forms, its changes, its origin.*

It is known that advanced advocates of evolution are not content with confining its operations to the vegetal and animal kingdoms. They assert that it explains changes in the material universe; indeed, those evolutionists who are materialists insist that all the changes which take place in the two kingdoms of life are due to purely physical causes. Evolution is exalted to the throne of the cosmos, and is not recognized as an agency in the hand of an Intelligent Personality. Consequently, in order to lay a foundation for the belief that "In the beginning God created the heavens and the earth," and that "In Him we live, move, and have being," it is necessary to enter upon a discussion of the problems imprisoned in the term *matter*. To a consideration of these we invite the reader in this chapter and in the three succeeding chapters.

The human mind, from time immemorial, has been

engaged in endeavoring to solve the mysteries connected with matter, force, life, mind, and spirit. It would be presumption to affirm that success has rewarded these labors; and scarcely less presumptuous to predict that a solution of these tantalizing enigmas will be furnished ere long. On the other hand, to deny that progress has been made, or to question whether the knowledge we now possess is either more accurate or more firmly established than that of former times, is to confess culpable ignorance. In solving the perplexing problems, the human intellect has made advances, especially in the last fifty years. Secrets, which since the dawn of time have lain concealed within the recesses of nature, have been wrested from her grasp and made subservient to the interests of humanity. Many problems bequeathed to us by buried generations have been solved. Not all have, however; and it is our present purpose to enumerate some of the unsolved, and possibly insolvable, mysteries which environ us. We confine ourselves, in this and the four succeeding chapters, to the difficulties—and of these the more superficial—which are imprisoned in the terms matter, force, motion, life, mind, spirit, personality, space, time, etc.

MATTER.

What is matter? This question has received no satisfactory answer, and probably never will. Apparently, no adequate answer is possible. We may conceive of it as an indefinable something in which a certain set of qualities inhere, and may designate that something as an essence having a probable existence; but scientists do not pretend to understand this essence, nor do they claim that it has been, or can be, defined.

Although quite unanimous in the opinion that there must be a basis in which the properties inhere—matter being something more than an aggregation of attributes—they are nevertheless forced to satisfy themselves with a knowledge of its qualities, if indeed, they are able to determine these with certainty, or to say which are essential to our conception of matter, and which are only its ordinary concomitants.

It is common to regard matter as that which affects the senses. Ganot, in his *Elementary Treatise on Physics*, defines it—if it be a definition—as “That which possesses the properties whose existence is revealed to us by our senses.” This, as a phrase intended to be descriptive of matter (certainly it is not a logical definition), is not only exceedingly defective, but is fitted to produce mistaken conceptions. It would seem as if he intended us to understand that matter neither does, nor can, reveal its presence to us. It can reveal its properties to us, not itself. Its own existence, then, is a mere inference—a deduction drawn from the innate conviction that the existence of attributes implies the existence of a basis of attributes. We have, however, a clear intuition that matter exists, and reveals itself to our senses; not indeed independent of its qualities, but that it reveals itself, and not merely certain qualities possessed by it.

Nor is it accurate to say that “the properties of matter are revealed to us.” The most we are justified in asserting, is that certain properties are revealed to us. We evidently do not know that all its properties evidence to us their presence. Indeed, we are unable to assign a sufficient reason why we should affirm that matter, in every form which it may assume, reveals its existence to us by even one of its qualities. Matter may exist, for

aught we know, under forms in which no one of its properties affects our senses. In some such forms it unquestionably does exist. By no sense that we possess can we detect the scent left by the fox in his track, though it is undoubtedly matter, and matter so arranged that the trained dog can determine which way the fox ran. We may tacitly assume that the odor of roses, the scent of mignonette, or the corpuscular emanations from musk do not exist in the atmosphere unless they are in such fullness as to be perceptible by the senses, or liable to detection by some device of ours, but it is nevertheless a purely gratuitious assumption. They evidently may exist, almost certainly do exist, so attenuated as to elude human detection. A solid substance, visible by the naked eye, may be converted into a liquid, then into a gas. In its gaseous state it may not be directly cognizable by any one of the five senses. Its presence, it is true, can generally be detected by some human device. Who is prepared to affirm, however, that every gas reveals its presence to us? Certainly, no one is entitled to affirm that it evidences its presence to us through our senses; and it is unscientific to assert that it invariably reveals itself in some way though frequently the road is very lengthy and exceedingly circuitous.

Nor does the difficulty terminate here. We have no right to affirm that we are able to detect the existence of any and every possible gas; nor have we a right to affirm that gases, under chemical changes, may not enter upon a fourth state, as much more attenuated than gas as gas is more attenuated than solids,—a state in which they may affect no human sense, and be discoverable by no human agency, though matter none the less. Who has proved that matter can only exist in one of three states,—the solid, the liquid, or the gaseous? The

attenuated ether with which scientists persist in filling the fields of immensity, and the interstices of even the densest metals as well, has not been proved to have an existence. The existence of this all-pervading luminiferous ether is a pure hypothesis. Whilst insisting upon this hypothesis, why do scientists continue to regard matter as "That which possesses properties whose existence is revealed to us by our senses"? According to their own concessions, matter exists in one form at least in which it does not reveal its existence to us; exists, and in quantity sufficient to fill immensity, rendering all space a "plenum"; in which shoreless ocean planets may swim, and light may sport itself, and gravitation may pass her unseen cables to distant orbs, and electricity may hurry her fiery steeds on missions to nebulous masses which are just beginning to palpitate with evolutional impulses; in which imaginary sea of attenuated matter liquids and solids may permit their molecules to float, each molecule, indeed each atom, enjoying the enswathement of a luminiferous, imponderable, invisible, intangible, undiscoverable, incomprehensible "material substance" whose properties are unknown and whose existence is hypothetical.

By Descartes, who regarded extension as the only essential property of matter, and matter as a necessary condition of extension, ether was regarded as a connecting medium between bodies at a distance from each other, rendering all space equally full. This plenum was regarded by the disciples of Newton as indispensably necessary in order to furnish a satisfactory explanation of the laws of gravitation. Huygens employed it to explain the propagation of light. Most scientists follow his example. Faraday conjectures that it is an agent in electro-magnetic phenomena. The authors of the *Unseen Universe* (a volume well worthy of careful study),

are disposed to regard it as a substantial reality, of which the seen universe is but a series of phenomena. Most physicists deem its existence in the atmosphere, in liquids, and in solids, an indispensable condition to the explanation of much that otherwise baffles science. Indeed, one may pertinently ask, whether in the ultimate analysis, every phenomenon of nature does not find its only satisfactory explanation in luminiferous ether.

Prof. J. Clerk Maxwell affirms, in the *Encyclopaedia Britannica*, under the caption, "Ether":—

"Whatever difficulties we may have in forming a consistent idea of the constitution of the ether, there can be no doubt that the interplanetary and interstellar spaces are not empty, but are occupied by a material substance or body, which is certainly the largest, and probably the most uniform body of which we have any knowledge."

As long as this all-potent "material substance" is neither discoverable by the senses, nor detectable by experiment, but rests exclusively upon the erring deductions of reason, those who are not scientists may be excused for regarding matter as not defined by saying it is "that which possesses properties whose existence is revealed to us by our senses." If we are scientific heretics, heretics we must remain, for the present at least. If "where faith begins, science ends," there must be but little science as yet. A wearisome enumeration of facts, though never so neatly dovetailed one into the other, can scarcely be said to attain to the dignity of science till they are explained on sound philosophical principles. Science may explain many links in the lengthy chain of phenomena. Whichever it may begin, however, and however long its explanations may prove satisfactory, it is certain, sooner or later, to reach some link which is veiled in impenetrable mystery. Why, then, should its devotees be so prone—a few of them—to cavil at theology because the christian

system encloses mysteries which the human intellect cannot solve?

To return: the above definition is also defective in another respect. If there may be matter which does not affect our senses, so also may there be substances, immaterial entities, which affect our senses. According to the usually accepted theory, neither sound nor light is matter; still each affects a human sense. It is usual to say that there are five human senses. Perhaps, it would be as philosophical to say that there is but one, touch; each of the five being a modification of this one. The eye, touched by light, gives a vision of the object whence the rays emanate. Something has touched the retina, forming a picture thereon. The ear, touched by sound, produces a mental sensation. Something has touched the drum of the ear, causing it to convey a certain sensation to the brain. The olfactory nerves, touched by odors, give rise to a particular sensation which we denominate smell. Something has touched a set of peculiarly sensitive nerves which are adapted to receive such impressions. The tongue, when touched by certain material substances, gives rise to the sensation known as taste. Something has touched a set of hair-like nerves, which are marvelously well fitted to respond to certain kinds of impressions. The nerves of the epidermis come in contact with some material substance. We have the sense of touch. If it is a material entity which touches these several sets of nerves (it confessedly is in the case of smell, touch, and taste), then is there matter which does not reveal itself to the senses as matter. The eye is incapable of testifying whether light is material or immaterial; whether it is matter, or an entitive substance, or a mere undulation. The ear has no evidence to present upon the question, Is sound corpuscular emanations of attenuated mat-

ter, or corpuscles of an immaterial substance, or a simple undulatory wave? Those, therefore, who do not regard it as attenuated matter thrown off by the rapid vibrations of a material substance, nor as a substantial entity of any kind whatever, but simply as an undulation, will be slow to regard matter as defined by saying that it is that which affects our senses. They recognize something else as affecting them quite frequently. If the undulatory theory is true—and it has been accepted by the majority of scientists since the time of Pythagoras—then two of our senses, sight and hearing, are affected by that which is not matter, nor any property of matter. Nay, since the mind during sleep, can affect the senses—sights being seen, sounds heard, and odors perceived which have no objective reality—and since the same effects can be produced by electrical excitation of the internal organs of the several senses,—the process being, as is conceded, purely subjective,—it is manifest that whether the undulatory theory is true or false, matter is not defined by saying it is “that which affects our senses.”

In like manner, heat, electricity, and magnetism can be recognized by the senses, though according to the accepted theory they are not matter; in the opinion of many scientists are not even substantial realities. By some they are regarded as qualities of matter.

Even if it shall be proved that these forces are neither affections of matter nor attenuated forms thereof; and if matter, so far as now known, affects our senses, it does not follow that in every form which it may assume, it proclaims its existence by affecting one or more of the five human senses. It is possible that it may exist under conditions unknown and unrecognizable by us. Perhaps, if we possessed other senses, or if those we now possess

were as much more delicate than they are as they are more delicate than those of the worm, or if each were as perfect as the most perfect sense possessed by the animal kingdom, we might be as much more extensively affected by matter than we now are as we are more extensively affected by it than the oyster is. Because we possess five senses, we are not justified in concluding that there are no other possible avenues through which matter might affect mind; and as several of these senses are confessedly more delicate in certain animals than in man, it is irrational to conclude that they are sufficiently delicate to be affected by properties of matter whatever form matter may happen to assume.

As matter, quite manifestly, is not recognizable in all its forms by the direct evidence of the senses, so neither is it by the exercise of our reasoning powers in judging, comparing, analyzing and inferring. We can recognize gravitation by a process of ratiocination; but we cannot recognize it with certainty as matter, or as not matter. It is almost universally regarded as immaterial; but is it less consonant with known facts to assume that it may be substantial threads of attenuated matter, or an immaterial substance, as truly an entity as the effluvium from a plate of platinum, which, if the plate is introduced into oxygen and hydrogen when mixed in a gaseous state, will cause chemical combination, though the plate is apparently altered in no respect? Why is chemical action induced by the mere contact of a foreign body? We denominate it catalysis. Shall we therefore proceed to affirm, as we do in the case of gravitation, that, whatever the agency may be, it is neither attenuated matter, nor an entitive substance? What else can it be? An effect has been produced. That effect must have a cause. If we are to consider gravity as the simple effect of

separate bodies upon each other, without the co-operation of any intervening medium, then matter is possessed of one property at least, which our senses are incapable of discerning, and which reason can neither explain nor prove to be an essential attribute of material substances. If, as Newton was disposed to think, gravitation can only act by and through something else; and if that something else is either invisible threads of greatly attenuated matter, or a substantial entity of some kind—it cannot be the intervening medium, for it acts through a vacuum; then may material substances either assume forms which even man's higher faculties are incompetent to recognize, or they can operate through substantial entities of which we know little or nothing. Newton did not regard attraction as an essential attribute of matter; nor did he regard it as capable of acting except through some agent. He says:—

“ That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance, through a vacuum, without the mediation of anything else, by and through which their action and force can be conveyed from one to another, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it. Gravity must be caused by an agent, acting constantly according to certain laws; but whether this agency be material or immaterial I have left to the consideration of my reader.”—*Newton's Third Letter to Bentley*.

A similar line of argument may be pursued in reference to heat, light, electricity, magnetism—all the so-called modes of motion. They are usually regarded as neither matter nor entitive substances. They nevertheless reveal their existence to us; though neither by the testimony of the senses, nor by experiment, are we able to affirm with absolute certainty what they are, whether incorporeal, intangible, immaterial entities, or attenuated matter, or modes of motion. Cogent arguments can be presented

in favor of each of the three theories. It is perhaps premature to say that either has triumphed over its rivals. If these forces are attenuated matter, the senses do not so testify with sufficient clearness to remove grave doubts. If they are properties of matter, the senses are incapable of convincing us of the fact. If they are substantial, immaterial entities, or are modes of motion, then the senses are affected by agencies that are neither matter nor properties of matter.

We have dwelt at considerable length upon the commonly accepted definition of matter, because, though scientists are willing to admit that we have no logical definition of the term, they nevertheless continue to employ expressions which seem to imply that it is definable. Besides, it has enabled us to see that if there are unexplained facts in the christian religion, so are there also in science; that if we cannot enumerate the contents of the term Deity, so neither can we enumerate the contents of the term matter; that if there are theological truths which we can but dimly comprehend, so also are there scientific truths upon which no human intellect has thrown clear light; that if God and his laws are unfathomable, so also are nature and her laws; that if faith is demanded of those who enter the domain of the christian religion, no less faith, probably greater, is demanded of those who journey through the paths of science; that if human reason must humble itself as it approaches the foot-stool of Divine Sovereignty, so also must it tread softly and bow reverently as it stands in the presence of the unveiled mysteries of nature; that scientists of the agnostic school who presume to pronounce God unknowable are assuming that nature is knowable; that those who regard the teachings of Scripture as unworthy of credence because its interpreters have frequently erred,

would do well to confess that the teachings of science are not always the utterances of infallibility.

An enumeration of the mistakes of science would prove instructive. This field, though inviting, we leave for the cultivation of our readers.

To resume: Rev. Dr. Joseph Cook, in his *Biology*, Lecture I., defends what he is pleased to call "the established definition" of matter, arguing with great cogency against Prof. Tyndall's conception of matter as one substance having two sets of properties, one set spiritual, the other set physical. Strange to say, though he expresses surprise that Mr. Tyndall presents no definition of matter, he neither presents one himself, nor pauses to tell us what is the established definition. That there is a prevalent conception of matter, backed by scientific authority, illustrated by numerous experiments, and sustained by acute reasoning, we do not deny. That it is somewhat hazy we supposed was admitted by all. If there is a logical definition we are not aware of it. Scientists are evidently ignorant of it, for they concede that matter has not been defined, and cannot be. They even admit that we are not able to say what are its essential qualities. Dr. Cook says, "It [the established definition] affirms that inertia, in the strictest sense of the word, is a property of matter. . . . It denies that matter has power to evolve organization and vitality. . . . It denies that matter has power to evolve thought, emotion, conscience, and will." It is evident that by "established definition," the author means us to understand *prevailing conception*. He is too acute a reasoner to fall into the error of imagining that we have a definition. That we are to interpret the expression as meaning prevailing conception is further evident from the fact that after affirming that the definition includes the

scription of inertia to matter, he proceeds to enumerate other properties, viz., "extension, impenetrability, figure, and color." Certainly it has not been proved that the above properties are all essential to the existence of matter, nor that they are all the properties which matter possesses. Evidently, matter cannot be defined by an enumeration of its properties unless we know what are its essential properties, being thereby able to exclude every non-essential and to include every essential property. This knowledge we do not at present possess, as all admit. Consequently, Dr. Cook no doubt concurs in the opinion that a logical definition has not been given, and cannot be; and that the descriptive phrases employed in the place of a definition are defective and unsatisfactory. That we are unable to enumerate the essential properties of matter will appear in the chapter following.

CHAPTER XII.

MATTER; ITS PROPERTIES.

OF matter, then, we have, as we have seen, no definition which will bear scrutiny. We cannot say of what genus it is a species. Relatively, it is a *summum genus*, and is therefore extremely difficult to define. We may affirm that it is not force, not life, not mind, not spirit; still we have no knowledge of its existence except as associated with one or more of these. Of its essence we know nothing. Science has not as yet shown itself competent to the task of enumerating its necessary qualities. Its properties are usually classified as follows:—

1. Essential properties, or such as are supposed to be necessary to our conception of matter, and to suffice to define it; viz., impenetrability and extension.
2. Accessory properties, or such as, though not essential, are supposed to be shared by all bodies; viz., divisibility, porosity, compressibility, dilatability, elasticity, mobility, and inertia.
3. Specific properties, or such as belong to matter under certain forms; viz., solidity, fluidity, tenacity, transparency, color, figure, etc., *e. g.*, the properties of oxygen, of iron, of vegetable substances, of animal matter, etc.

It would be hazardous to affirm that these properties, or indeed any definite number of them, are ultimate facts. The ultimate qualities are no doubt much fewer.

Of course particular properties cannot be said to be properties of matter; they are merely properties of certain aggregations of matter. Solidity and figure may be said to be qualities of granite, of iron, etc. Fluidity is a quality of mercury, of water, of milk, etc. Tenacity may be designated a quality of oak, of tin, of zinc, etc. Transparency is a property of glass, of clear water, etc. Neither of the five, however, can be said to be a quality of matter, for matter can unquestionably exist in forms which do not, and cannot reveal these properties, nor indeed any one of them. No one pretends that color is an essential quality. Of the accessory properties, as is evident, elasticity, dilatability, compressibility, divisibility, and porosity cannot be properties of an atom, which is none the less matter on that account. If an atom has pores, or is elastic, or can be compressed, or can be dilated, then it can be divided. If it can be divided, it is not what it is defined to be, the smallest possible portion, incapable of further division. And if an atom cannot have these properties, then they are not essential to matter. They can belong to it only on the hypothesis that it is infinitely divisible, a single particle being capable of pervading immensity. But if it is infinitely divisible, space must also be infinitely divisible. Unless we are prepared to believe that both are infinitely divisible—which science does not sanction,—we are forced to concede that elasticity, porosity, compressibility, dilatability, and divisibility are not properties of matter, though they are properties of aggregations thereof. Mobility, or the property in virtue of which a body may change its position, few, if any, would be disposed to regard as an essential property. Indeed, absolute rest is a thing unknown. Everything is in motion; perhaps is subject to several motions at the same instant.

The mountain-rock and the forest are moving with the earth on its axis, are journeying around the sun, are swept through space in conjunction with the solar system; perhaps, as some scientists assure us, their atoms are also in ceaseless motion, those of the densest rock and those of the hardest tree producing, it may be, a ceaseless hum by their infinitesimal movements. Rest and motion are relative terms. Mobility, a purely negative quality, is accordingly not generally regarded as an attribute of matter. If attraction, repulsion, and polarity are properties, they are one property variously viewed.

Nor can it be proved that inertia—the inability of a body to set itself in motion when at rest, or to cease moving when in motion—is an essential property. As already intimated, perhaps it is more accurate to say that not inertia, but motion is an attribute of matter, no material substance being ever at absolute rest. Even on this hypothesis, it should be borne in mind that it is one thing to say that it does not cease moving, so far as man can discern, and another thing to say that it cannot cease moving. If matter is incapable of changing its state of rest, then, seemingly at least, neither attraction nor repulsion are among its essential attributes; if it is incapable of changing its state of motion, then, apparently, there can be no such thing as an equilibrium of forces. We are not warranted, however, in saying that the forces of an atom may not so accurately counterbalance each other as to leave it at rest, provided it were not subject to the forces of other atoms. Unless an atom has the attribute of motion, so that it would move though it were the only material substance in the universe, motion cannot be said to be an attribute of matter. Unless rest can be produced in a universe in

which atoms mutually influence each other, tending to produce motion, then absolute rest cannot be said to be an attribute of aggregated molecules—the molecules of every individual mass of matter must be in motion *inter se*, and must tend to produce motion in every other adjacent body.

We may assume that if matter were at rest it would remain so eternally unless set in motion by some power from without; and that if it were in motion it would continue moving forever unless stopped by some external agencies; that is, we may assume that inertia is one of its essential properties. This has not been proved, however. It is a purely gratuitous assumption. We have no knowledge of it at absolute rest. We have no testimony which warrants us in asserting that it is incapable of originating motion. It may be—probably is. We can say no more. Accordingly, eminent scientists concede that inertia is not an essential property. Ganot defines it as “a purely negative property,” and of course admits that it is not a necessary attribute. Though matter may exist, it is true, under forms which are incapable of being subjected to human observation, or even to scientific experiment, it is nevertheless unscientific to ascribe to it a property which has not been proved to belong to any of its forms yet brought under scientific investigation. Though Prof. Tyndall may ask, “Who will set limits to the possible play of atoms in a cooling planet?” and may regard all life as once “latent in a fiery cloud”; and though the admission that molecular activity may possibly be an invariable attribute of aggregated matter may seem like a concession to materialism, we are indisposed to regard inertia as an essential property. The concession can do materialism no good, for Prof. Tyndall himself admits that “molecular motion explains nothing. . . The pas-

sage from the physics of the brain to the corresponding facts of consciousness is unthinkable."

Accordingly, matter has only two essential properties, impenetrability and extension, other properties being regarded as specific, that is, properties which belong to it under certain forms, not to it in every conceivable form it may assume.

As we have already seen, there are those, it is true, who regard motion as an essential attribute; others regard attraction and repulsion, or the influence of one atom upon another, as a necessary property. It is the accepted theory, however, that impenetrability and extension are the only essential attributes.

The extreme difficulty of arriving at any measure of certainty is seen in the fact that reason does not warrant us in affirming that even impenetrability is an essential quality. That no two material entities can occupy the same place at the same time is not an axiomatic truth, much as it resembles one. It rests upon experience. It assumes, what has not been proved, that an atom of iron and an atom of musk cannot occupy the same space at the same moment; that an atom of platinum, the densest known metal, and an atom of the ether, which is declared to pervade all material substances, cannot be in the same space, but must lie side by side, though the latter is nearly as incomprehensible as the former. We do not deny that impenetrability may be an essential attribute. To the question, Has it been proved to be? we answer, No.

Professor J. Clerk Maxwell says:—

"Boscovich himself, in order to obviate the possibility of two atoms ever being in the same place, asserts that the ultimate force is a repulsion which increases without limit as the distance diminishes without limit, so that two atoms can never coincide. But this seems like an unwarrantable concession to the vulgar opinion that two bodies cannot co-exist in the same place. This opinion is deduced from our experience of the behavior of bodies of sensible size.

but we have no experimental evidence that two atoms may not sometimes coincide. For instance, if oxygen and hydrogen combine to form water, we have no experimental evidence that the molecule of oxygen is not in the very same place with the two molecules of hydrogen. Many persons cannot get rid of the opinion that all matter is extended in length, breadth, and depth. This is a prejudice of the same kind with the last, arising from our experience of bodies consisting of immense multitudes of atoms.”—*Encyc. Brit.*, article, “Atom.”

Descartes maintained that the entire universe was full of matter constituted of one single element and having only one essential property, extension. He believed that on testing the accepted qualities of material substances we are logically driven, in every instance, to the conclusion that nothing is essential except extension; and that all forces have their ultimate origin in Deity. Consequently, man cannot increase the sum of motion, though he can alter its direction. In a theory of the universe, force is no necessary factor. We have nothing to do with anything save motion, which is simply the passage of a body from one point to another. Empty space is a fiction. The entire universe is full of matter—more dense and less dense—full everywhere. A vacuum is a myth; an atom, an inconceivable figment. Matter is infinitely divisible.

It is questionable whether the results of this *a priori* reasoning have been subverted by the experiments with which the inductive method of studying science has rendered us familiar. We are tolerably safe in affirming that science has not yet proved that matter has more than one essential attribute, extension; nor that what it denominates an atom may not be an aggregation of infinitely divisible particles; nor that the physical forces may not be the immanence of the divine will in nature. To concede that the forces of nature are inherent attributes of matter is to make a concession helpful to materialism. It is thereby encouraged to make the

assertion that mind, a particular kind of force, is an attribute of matter.

It is not denied that matter may assume new properties on its assumption of new forms; but to say that the usually enumerated attributes of matter belong to every form which matter may assume, and consequently to every atom, is to make an unwarrantable assertion.

If, as is quite generally conceded, force is immaterial, the question arises, Is it not an invariable concomitant of matter? Science, with considerable unanimity and with no little confidence, is disposed to answer, Yes, for no matter, so far as we know, exists without force; and indeed, no force, not even mind, so far as observation extends, either exists or can exist dissevered from matter. Even the latter half of this statement, if established with scientific accuracy, need cause the christian no alarm. An immaterial entity may perhaps not exist dissevered from matter. If it shall be made to appear that the mind neither exists nor can exist except in association with matter, it will still be competent for us to affirm, It has not been proved that the mind is material, nor that it perishes with the body. The soul, when its connection with the earthly tabernacle is dissolved, may possess a celestial body. Paul seems to intimate as much, for he says there are celestial bodies and terrestrial bodies, the glory of the celestial being one, and the glory of the terrestrial another. Those, therefore, who persist in assuring us that a "disembodied spirit" capable of seeing without eyes, of hearing without ears, of remembering without a brain to retain impressions, of loving without mental sensibilities, of reasoning without lobes of the brain with which to carry on the process, of willing without volitional

nerves—those who regard this as an irrational conception, inasmuch as we neither know nor are capable of conceiving of mental activity dissevered from matter, must undertake to prove, what christians are under no necessity of believing, that the soul after the death of its present body has no material tabernacle, no “house from above, not made with hands,” no body however attenuated, because it has none which is visible, tangible, and ponderable. Because angelic existences, and human souls when released from earth, are supposed not to possess terrestrial bodies, it does not follow that they are bodiless. Who is prepared to affirm that the human soul, which constructs for itself a body fitted to its existence on earth, cannot construct for itself a body adapted to another state of existence?

It is common to divide matter into two classes, the inorganic and the organic; and yet, perhaps, we ought frankly to admit that the only difference is in the arrangement of the molecules. The material which enters into living organisms—unless, as has not been proved, life itself is matter, and perhaps even then—is most probably the same as that which, when not in organic form, we denominate inorganic. The organa hasten back into the inorgana. And yet, why is animal life dependent upon the pre-existence of vegetable life, being incapable of assimilating anything else than protoplasmic elements? Perhaps, the only answer which can be given is this: Because animals are so constituted by their Creator as to need, for their sustenance, material substances combined in such proportions, and possibly with the molecules arranged in such ways as neither occur in inorganic nature, nor are capable of being produced by man independent of the operation of vital forces. Man has never made an atom of food from inorganic matter. Why is

the vegetable kingdom capable of doing what the animal kingdom is incapable of doing—feeding upon ammonia, carbon, phosphorus, etc.? We are disposed to answer, Because God has so constituted it. Can evolutionists present a more satisfactory solution?

Some are disposed to consider it probable that there is only one material element in the world. They remind us that though the number of the elements was once thought to be countless, it has been reduced to sixty-three, and may soon be lessened; that no one is prepared to say that a complete analysis would not prove that everything can be reduced to one element; that chemistry is accumulating testimony to this effect; that the number and variety of the forms assumed are due to different arrangements of molecules. These, it is argued, when arranged in a certain set of ways constitute solids—mineral, vegetable, and animal—with their various properties; when arranged according to a different and definite system, constitute liquids, with their several specific qualities; when arranged in accordance with a third method, constitute gases with their particular attributes; when arranged in a fourth way, constitute Prof. Crooke's fourth state of matter, light, heat, electricity, magnetism.

Perhaps, we ought to concede that it is somewhat irrational to assume that there is any radical difference in the substratum of material substances. Possibly, we shall yet be forced to content ourselves with establishing a basic distinction between mind and matter, between the immaterial and the material, between corporeal entities and incorporeal entities. Platinum, the densest known material substance, may be converted into a liquid, then into a gas. May it also be converted into a fourth state, electricity? May it be, as Prof. Lockyer conjectures,

that all material substances have been condensed from one single basic element ?*

If, so far as the three states of matter are concerned, there is only one elementary substance, then what are its properties ? Are these its affections; light, heat, electricity, magnetism, motion ? Are these the agencies which arrange material molecules in their varied forms ? Are these several affections only modes of motion, leaving the original element with only one attribute, motion, eternal and indestructible ? This question will come under discussion when we come to treat of forces. Is life simply a particular molecular arrangement, a certain affection of matter ? This theory we shall examine when we consider the question, What is life ?

Speculation, whose unwearied wings essay the impossible task of reaching the outer boundaries of immensity, has favored us with the hypothesis that there may be but one substance in the universe. We are assured that the tendency of science is towards unity, and that it is most philosophical to conclude that there is only one substratum in the universe, and that in this, any or all qualities may inhere. By some, matter is regarded as this under-lying entity. Our argument against materialism will be found in a subsequent chapter. Others prefer to regard spirit as the only reality. They deny that

* Prof. W. R. Grove, in treating of the correlation of the physical forces, informs us under the head of *Catalysis*, that if "one portion of a strip of platinum is immersed in a tube of oxygen, and the other in one of hydrogen, both the gases and the extremities of the platinum being connected by water or other electrolyte, a voltaic combination is formed, and electricity, heat, light, magnetism, and motion produced at the will of the experimenter."—*Correlation and Conservation of Forces: a series of expositions by Prof. Grove, Prof. Helmholtz, and others, with an introduction by E. L. Youmans, M. D.*, p. 170.

Is the platinum converted into electricity, heat, light, magnetism, and motion? It would, perhaps, be unscientific to say that the facts were inexplicable on this hypothesis. We wait for further light.

matter has any real existence. All visible objects are regarded as conceptions of the creative faculties of the human mind. The only existences are the soul and its creations.

The difficulties connected with the acceptance of idealism are many and serious. One readily suggests itself. If the pen with which I am now writing has no existence, being merely a conception of my own brain, then how am I to be convinced that my subjective conception of a pen has any reality? To the idealist I may say, Your conception of a pen is not a reality. You have only a conviction that you have such a conception. Even this conviction is not a reality, for you have only an impression that you have such a conviction. Your impression that you have a conviction of the existence of a conception of a pen is not a reality, for you have only a fancy that you have such an impression. This process may be continued to an unlimited extent, forcing him to concede either that all are real, the fancy, the impression, the conviction, the conception, and the pen, or to acknowledge himself drifting hopelessly upon the sea of absolute skepticism. He can know nothing, not even the reality of his own existence. The universe is a phantom; life, a dream; existence, a perhaps; thought, a succession of fleeting shadows cast by nothingness upon the dark curtains that pavilion it. Everything is an illusion.

Even this, some are prepared to admit. The agnostic asserts, We can know nothing. Then how does he happen to know that we can know nothing? His labored arguments to prove the theory he adopts, completely demolish it the moment they acquire sufficient cogency to establish it. This looks like intellectual suicide. He has no faith in the trustworthiness of the senses; no faith in the validity of human reason; still he employs reason

as a means of acquiring a knowledge of the fact that he can have no knowledge. As he boastingly asserts that no human being can know anything, it is somewhat presumptuous to undertake the task of convincing the world of the truth of his theory.

Of those who are indisposed to rest satisfied till they have obtained a unified conception of the universe, there is a third class, substantialists. These regard it as possible, and probable, that all substances, the immaterial and the material, may have been formed by the divine fiat from one elementary substance. This theory, as its advocates claim, presents a beautifully consistent and closely connected series of effects, from the eternal, self-existent fountain of all being, down through spirit, mind, instinct, life, magnetism, light, heat, electricity, and gravitation, to what are known as material substances in their third state (assumed to be the most attenuated state of which they are capable),—odor, gas, air; thence through the second state, liquids,—water, mercury, etc., to the solids,—earth, wood, lighter metals, rock, steel, platinum. One eternal substance exists under the various forms which Deity has seen fit to impose upon it. This substance in its original condition is not to be regarded, however, as gross matter, but as an indestructible, substantial entity, imponderable, intangible, invisible;—as that, perhaps, which passes under the designation of spirit. Every entity is a portion of this eternal substance in some one of the innumerable stages of its ever-varying condensation.

Professor Tyndall's conception of matter, as also the conception of Bain, Spencer, and others, is that of a single material element having two sets of properties, the spiritual and the physical. This theory will be examined at greater length in succeeding chapters. Meanwhile, it

may suffice to note the fact that determined efforts are made to change the current conception of matter, substituting this exploded doctrine of hylozoism, revamped and accommodated to the nebular hypothesis, to evolution, and to the atomic theory. Every living organism, it is assumed, has been successfully traced back to one primordial germ, the primeval parent of everything possessing life, whether vegetable or animal. From this one germ evolution has developed everything, and is capable of explaining all changes; for matter has spiritual attributes as well as physical: it may hate, love, hope, will, reason, etc., as well as possess solidity, tenacity, elasticity, color, weight, etc. This all-potent germ, it is assumed, was once potentially in the chaotic elements from which the solar system was formed. "Emotion, intellect, will, and all their phenomena were once latent in a fiery cloud." "I discern in matter the promise and potency of every form and quality of life." We are expected to change our conceptions of matter and to regard mentality as one of its affections. Indeed, it is candidly conceded that unless the distinction between mind and matter, as heretofore understood, is broken down, it will be impossible to banish God from the universe. "Either let us open the doors freely to the conception of creative acts, or, abandoning them, let us radically change our notions of matter."

The advocates of this form of materialism boastingly assert that belief in the existence of two substances, mind and matter, is no longer tenable, having been abandoned by the most advanced thinkers. But if these reasoners will take the trouble to read the history of materialistic theories and atheistic speculations, their enthusiasm may possibly subside. Belief in spiritual existences is an apparition which has not disappeared at

the bidding of materialistic metaphysicians; and it is safe to say will not till the granite wall, the distinction between mind and matter, has crumbled to decay and been swept into oblivion, not by the hot breath of angry contention, but by the force of irresistible logic from the lips of those who whisper amid their burning tears, Alas, there is no spiritual God.

It is safe to say that the highest generalization which science has as yet been able to reach is, that there are three substances, each possessing a unity of its own and correlated with each of the others:—

1. *Matter*, capable of existing in countless myriads of forms under three states, solid, liquid, and gaseous,—the basic elements being substantially the same, and possibly one single element, in whatever condition it may exist.

2. *Physical force*, immaterial, indestructible, convertible, most probably the immanence of the Divine Will in nature; capable of existing as light, heat, electricity, magnetism, and chemical affinity, each of which can be converted into, and has its exact equivalent in, each of the others.

3. *Life*, capable of manifesting itself under innumerable forms in three distinct though allied states, vegetable, animal, and rational;—life without mentality or spirit, plants; life with mentality in varying degrees, but without spirit, animals; life with both mentality and spirit, man.

This makes three realms, matter, force, life; three substantial entities, only one of which is material, the remaining two being entitative existences, though immaterial. Of course speculation is at liberty to employ itself in the arduous attempt to reach a higher generalization, and to prove, if it can, that these three substances

are only different modes of existence of one and the same eternal substance. As yet this task has not been performed. When it shall be, if it ever shall, a Personal Will may be found to be the origin of all things; science, at the end of her lengthy process of induction, attaining the result which faith has long since reached, and reason is now able to sustain by unanswerable *a priori* arguments. We can well afford to encourage science in prosecuting her investigations with vigor, fearless of the legitimate results of careful inquiry.

Matter has not been defined, not even have its boundaries been accurately traced.

CHAPTER XIII.

MATTER; ITS ORIGIN.

IN reference to the origin of matter various opinions have prevailed and do still prevail, especially in cultured nations. Savages, it is true, seldom pause to ask whether that which exists needs to have had a beginning—it exists, they trouble themselves no further; but in every age the thoughtful have been persistently endeavoring to answer the question, Whence came matter? To the incessantly recurring inquiry, the following responses have been made:—

I. Matter had no beginning. It is eternal, having always existed substantially as it now is. This is the theory of materialistic atheism.

II. Matter is an evolution from force, whose original homogeneity differentiated into heterogeneity, producing light, heat, magnetism, electricity; through these agencies, matter, in its myriad forms, came into existence, being a product of eternally-existent, omnipresent Force. The only "Eternal Reality," the only "Unconditioned Entity," the "Cause of all causes," is Force. This is the theory of physical atheism.

III. Matter is embodied thought. Thought, "the Ultimate of all ultimates," "the Source of all beginnings," impelled by an innate necessity, evolved into force, into laws, into material existences. The universe is manifested thought, coming to self-consciousness in

man. "An Absolute Idea" is the enduring Reality. This germ has produced pantheism in its various forms.

IV. Matter is the immediate creation of a supramundane God. This is the theory of absolute creation, or creation *ex nihilo*, as it is denominated (inaccurately, we think). It is the opinion generally adopted by the Christian church. In the Westminster Confession of Faith it is expressed in the following terms:—"It pleased God . . . for the manifestation of the glory of his eternal power, wisdom, and goodness, in the beginning, *to create, or make of nothing*, the world and all things therein, whether visible or invisible.

V. Matter is an effluence from Deity, produced by the exercise of his own will. God formed the universe out of the fringings of his own eternal garments. This theory is adopted by a class of theologians who regard it as irrational, if not indeed inconceivable, that something should come from nothing, even in obedience to the fiat of an omnipotent God.

What is the absolute Cause of all things? Five answers have been given; Matter, Force, Thought, an Unconditioned Divine Will, a Personal God. Of these, two are atheistic; one is pantheistic; two are theistic. To their consideration we address ourselves.

I. MATTER HAD NO BEGINNING.

Materialists persist in asserting that it is as rational to affirm that matter is uncreated and eternal, as to affirm that God is an uncaused, eternal Being; that inasmuch as we have no proof that since the beginning of the present order of things a single atom has been created or has been annihilated, or indeed can be; and inasmuch as no trustworthy evidence exists that there are any realities except the protean forms of this ever-changing, infinitely plastic material substance; and inasmuch as this

dictum of science, "No matter, no force: no force, no matter," necessitates the belief that thought may be, almost certainly is, one of the attributes of matter, as much so as solidity, weight, elasticity, etc.,—therefore, it is most consonant with reason to assume that matter is self-existent, all-potent, eternal, the Unconditioned Cause of all causes, the Absolute Reality.

In refutation of this atheistic theory it may be said:—

I. To say that self-consciousness is an attribute of matter—as this theory must—is to make an assertion which is not only at variance with our fundamental notions, but is nearly, or quite, inconceivable. To assume that matter can work itself into forms in which it becomes conscious of its own existence is an assumption which few are disposed to make. It requires a radical change in our conceptions. I am conscious of my own existence. I have no doubt of the existence of other self-conscious beings. I believe in the existence of objects which are devoid of self-consciousness. I see the earth on which I tread—not all of it, but enough to assure me that it is something outside of myself. I see the sun in the heavens—not in its totality, but I am confident it is something totally distinct from the subjective reality which contemplates it. I see material objects all around me—not all of them, but I am convinced that they are a part of the *non-ego*, the not-self. I cannot see all the matter in the universe, but I have an intuitive conviction that the reality which discerns is distinct from the objects discerned. Indeed, when one comes to a consciousness of his own existence as an entity distinguishable from all other entities, he is forced by the principle of causation to believe in the possible existence of a higher self-conscious Personality, of which he himself, all other self-conscious beings, the world, all existences, are but effects. Unconsciousness

cannot grow into consciousness; the cause which originates personality must be a person. Rationality cannot have irrationality for its father. Will cannot be the child of matter. The sensibilities cannot be the fruitage of insensibility. Freedom cannot be the blossom of inexorable necessity. An intelligence which is capable of employing fitting agencies for the accomplishment of predetermined ends cannot arise out of nescience.

Self-consciousness is a rock upon which every materialistic theory may be ground to powder. To this we shall recur in a subsequent chapter. Our present purpose is merely to outline an argument.

2. Materialism fails utterly in accounting for the sense of personal identity. If there is nothing in a human being but matter, and that, as is conceded, is in constant flux, the entire body disappearing every year as science now asserts, how does it happen that we retain the conviction of identity? It is granted, alike by theists, by pantheists, and by atheists, that the Uncreated Source of all things must be a unity, self-existent, omnipresent, eternal. It is conceded that this First Principle must contain in itself a sufficient reason for all that has occurred and for whatever now exists. It must be a perfect generalization, an absolute *summum genus*. It must furnish a satisfactory, at least a credible, explanation of every fact in the universe. It is the demand of reason that everything in the domain of the actual should find at least a plausible solution in that which is assumed as the Absolute Reality. Is the sense of personal identity explained, or is an explanation possible, or even conceivable, on the hypothesis that matter is the self-existent, omnipresent, eternal unity? We unhesitatingly answer, No. Still, no one will deny that there is such a thing as the sense of continued personal existence. How is this

even conceivable on the theory of the materialist? If there is nothing but matter and its inherent forces, and if the human system is undergoing incessant and rapid changes, how is it possible to retain the sense of identity?

With scarcely less cogency we might ask, How is it possible to explain memory?

This argument, however, and the preceding as well, will be more fully elaborated when we come to discuss mind and its relations to matter. We are now more immediately concerned with the question, Is matter eternal? No: for,—

3. Behind the phenomenal there must be the real; antecedent to the mutable there must be the immutable; *i. e.*, a Personal Being who finds his motives to action in himself alone.

The solar system came into being as a result of transmutations. The sun is subject to incessant changes and is destined, apparently, to ultimate extinction. The earth, under the disintegrating influence of storms, of sunshine, of frost, of winds, of earthquakes, and of volcanoes, is ceaselessly changing its external aspect, and is hastening to enter upon another condition. Plants are evolved from germs: they perfect themselves, and then perish, others taking their places. Animals are born, live and die—the succession coming forth from the buried past, and capable, apparently, of extending into the indefinite future. Death is succeeded by life; genesis, by annihilation. Is the universe a mere succession of fleeting phenomena? No: beneath the changing there must be the enduring; behind the mutable, there must be the immutable; back of the varying there must be the constant. There could not be the unstable phenomena, unless there was an abiding Reality.

Reason, then, is forced to concede that there must be

an enduring substance, a "something" which continues while all else changes, "a something" which is at once the substratum of changes and the cause which produces them. Can this substance be matter? No: for it also is undergoing ceaseless change, forming itself into new worlds, hastening forwards into new forms; it is itself phenomenal. An intelligent design runs through all the changes, a design which it is impossible to regard as one of its attributes. The cause of all reality must not only be itself a reality; but it must possess efficiency adequate to the production of everything, itself excepted. Can impersonal matter produce personality? To the production of this there must evidently be a self-determining will; there must be self-consciousness. Nothing can be the father of personality but personality; that is, consciousness, will, separate subsistence—the essential elements of personality.

The Absolute First, the Primus, the Cause of all changes, must therefore be a Personal Will. If it is necessary to postulate the existence of matter to account for phenomena to which it gives rise, it is no less necessary to postulate the existence of mind in order to account for phenomena to which it gives rise, and which are otherwise inexplicable.

An eternal succession of phenomena implies the existence of an eternal substance capable of producing the phenomena. Is it possible to believe that an eternal succession of shadows can chase each other across the meadow unless there is somewhere a substance capable of casting the shadows? Certainly, an eternal succession of shadows cannot be cast by an eternal succession of shadows.

An infinite series of changes implies an enduring substance which is the subject of those changes. An infinite

series of shadows, each cast by a shadow that went before, is inconceivable. The first duty, therefore, of the materialist is to inform us what is that underlying reality which remains unchanged and unchangeable in all the forms which matter assumes. He has not defined matter; he has not informed us what are its essential qualities. What attributes are common to all its forms?

We affirm, then, that behind the evanishing there must be the abiding; behind the powerless there must be the potent; behind the seen there must be the unseen; back of the material there must be the Immortal.

4. It is inconceivable that the changes to which matter is subject should evince design, if there is no Personal Will. In what does this adaptation of means to ends inhere? Evidently not in matter, for design is not one of its attributes. What, then, is it which produces these purposive changes? what organizes and governs all things? What determines all forms, all relations, and the adaptations everywhere apparent? A development without a beginning is inconceivable; an evolution without an evolver is an absurdity; the atheist does not render it possible to conceive of a series without a first term, by simply asserting that the series is infinite. He has not imparted a finite conception: he has only produced confusion. If there is no design in any single member of the series, the series does not become purposive by becoming infinite. Besides, how can there be a succession of members, separated from each other by unity, without unity, or a starting-point, as a basis?

It is safe, therefore, to affirm that reason, while demanding unity in the source of all beginnings, is unable to rest in a unity which is conditioned, changeable, mindless, purposeless. It demands not merely that which may perhaps be self-existent; but it demands that which

is certainly self-determined, a Personal Will. Its First Cause must be capable of furnishing an adequate explanation of the existence of all systems, all suns, all worlds, all bodies—all material entities; an adequate explanation of all motion, all force, all changes—all physical entities; an adequate explanation of all growth, all decay, all death—all the phenomena of plant life, of animal life, of rational life—consciousness, reason, emotion, conscience, will, personality. Its unmistakable testimony is, The First Cause must be a Living Personality, “for whom, in whom, and to whom are all things.” Matter, even if it could be proved to be self-existent and eternal, would not answer the necessities of the case. The human intellect refuses to rest in any first principle which is not absolutely first, in any reality which is not an Unconditioned Reality, in any unity which is not the Ultimate Unity. It affirms that the cause of causes must be the personal will of a self-existent, eternal Being who finds all motives to action in himself alone—an Unconditioned Will which realizes itself in self-potency, manifests itself in efficiency, and finds the complement of its activity in a created universe. Will, not matter, not force, not thought, is the Final Cause of all things.

We have ascribed an unconditioned will to Deity, though some, we are aware, are of the opinion that Deity, in the act of creation at least, is conditioned by the necessary existences, space, time, number. We prefer to regard Him as an absolute, unconditioned First Cause; and to regard space as a result of His omnipresence, time as a result of His existence, and number as a result of His unity. This opinion is environed by fewer difficulties than attach to the theory which is recommended in its stead. If we regard time, space, and number as eternal, and independent of Deity, we are immediately asked,

Why then may not matter also be self-existent, eternal, and independent? Though it is evident that the basis of the assumption of the eternal and independent existence of the latter is quite different from the basis which is supposed to support belief in the eternity of space, still, it cannot be denied that the moment we admit that there can be anything uncaused, save the First Cause, we encourage the assertion, Then matter may be uncreated and eternal—consequently the universe never had a beginning. And if matter may be eternal, why may there not be an eternal order of the universe? And if order is an eternal law, why may there not be an infinite series of changes each evincing adaptation? If the physical forces have an existence independent of Deity, why may not the same be true of the laws of life, of mind, of spirit, as also of the distinction between right and wrong.

It thus appears that it is the wisest course, as well as the most logical, to fix upon an Unconditioned Will as the origin of all things.

5. If matter is in the process of evolving "an infinite series" of changes, then the universe must have originated in a single atom, or must be in the stage of reducing itself to a single atom. The series of changes cannot be infinite unless it includes changes from less quantity to greater quantity, and from less potency to greater potency. Indeed, it is doubtful whether there can be a series which is neither ascending nor descending. Certainly such a series, if any such is possible, will not include an infinite number of changes; and if it is said that the series is infinite, though the changes are not infinite, we respond, As it is a succession of individual changes which constitutes the series, the series cannot be infinite unless the changes are infinite. An infinite series of changes in matter must therefore include all

possible changes between an atom and immensity filled with the densest metal possible; all changes between an infinitesimal unit of force and illimitable force. Moreover, in order to be a series, the succession of changes must have commenced either with an indivisible atom which would have ceased to be matter had division been possible, or must have commenced with the greatest conceivable quantity. The latter could not have been the case; for that would imply successive annihilations of material substance, which science pronounces impossible. Besides, this would not answer the purpose of the evolutionist. It would not be evolution, but progressive annihilation. Consequently, "the infinite series" of changes must have commenced with an atom possessing an infinitesimal unit of force. Not matter in its present totality, but the atom must have been the First Cause of all things. Can this be denied by any one desirous of reaching ultimate unity?

This unfortunate phrase, "an infinite series of changes," promises well, but on examination is found incompetent to explain the problem whose solution is sought. It cannot begin with an atom, for successive changes towards increased quantity is an absolute creation—a thing pronounced inconceivable. If an Infinite Personality cannot create objectivity, so augmenting the quantum of existence in the universe, then "an infinite series" cannot. How could a second atom come into being? The phrase, therefore, explains nothing, unless it is understood as a circumlocution for the term God. By most persons, however, the monosyllable is considered preferable.

6. The majority of the human race have maintained that reason necessitates belief in the existence of a First Cause independent of matter, a supramundane

Personality. Plato exclaims, "Mind is king of heaven and earth." "God is the most excellent of causes." Nearly all languages, even those of savages, have a term whose content is the intuitive conviction that there is a Divine Personality back of nature. Polytheism, with its gods many, generally has one who is regarded as the Father of all the divinities, the Source of all existence, all potency, all causality, all personality, a Jupiter Omnipotens. With the christian theist the conception of Deity embraces independent existence, unlimited power, unconditioned will-force, perfect personality.

We have the right to present the universality of this belief as evidence that it may be regarded as reasonable, and as environed by fewer difficulties than any rival theory. It is indeed the broadest conception that ever entered the mind of man. The reasons, therefore, which impel to its reception must be potent.

II. MATTER IS AN EVOLUTION FROM FORCE.

Force is the only reality. In the beginning there was force—nothing else.

Nearly or quite all the arguments which we have outlined, in the discussion of the theory that matter is the source of all being, apply with equal cogency to the theory that force is the First Cause, *verbis mutatis*. We pause long enough, however, for the succinct enumeration of a few others.

1. Since the term force, as here employed, does not designate a quality, but an abstract reality; and since reason requires that the Final Cause shall be a unity, and not a duality; and since, consequently, there was originally no matter in the universe,—force must be regarded as adequate to the origination of something external to itself, and of a nature different from its own. How shall it proceed ?

(a) It cannot evolve matter from itself, for by hypothesis it is not matter; and there can be no evolution unless there is a preceding involution.

(b) It could not have gathered objectivity from the limitless abysses of uncreated space, and from this fashioned a universe; for, by supposition, there was nothing in existence save force.

(c) It could not, by differentiating through "an infinite series," acquire the power of originating matter, for no one member of the series could impart a power which it did not itself possess.

2. Since, by concession, force is not matter, the theory has no advantage over that which it is intended to displace; nay, it is at a disadvantage. It leaves us to believe in absolute creation, which is pronounced inconceivable; and it does not present us an Intelligent Personal Will as the Creator, but blind, mindless, purposeless force.

3. There are not only individual forces, closely correlated one to the other, but there are laws of force, each manifesting intelligent design. Observing everywhere the sway of laws which evince wisdom, will any one say that the preponderance of probability is against the hypothesis of a Lawgiver? Who then enacted them? Who maintains them? Blind force knows nothing about devising intelligent laws. Consequently, in the presence of the fact that law holds universal sway, I am impelled to exclaim: There must be a Being from whom law emanates. An atheist I cannot be without doing violence to reason.

When one contemplates power as manifest in the volcano or in the earthquake; when he learns that the nebula known as the Milky Way is moving through space with its millions of suns and their accompanying planets,

at the average rate of three thousand miles a minute, and that the planet Jupiter, fourteen hundred times larger than the earth, is whirled forwards at the rate of thirty thousand miles per hour, and that the comet of 1680 is traveling with the velocity of eight hundred and eighty-four thousand miles an hour,—he is disposed to conclude that if there were no Intelligent Will back of the physical forces they might cause infinite confusion, if indeed they did not resolve the universe into its original chaotic state. After observing evidences of design in the subordination of forces to the accomplishment of a definite purpose, it requires hardihood to affirm that the preponderance of evidence favors atheism.

In the presence of facts, we are indisposed to present labored arguments for the purpose of destroying the foundations of atheism. To attempt this, seems to us like reasoning to prove that man is possessed of reasoning powers; like piling up syllogisms to prove one's personal existence.

As we shall attempt to show in the succeeding chapter, most physicists of the present day are disposed to regard the physical forces—all force—as the immanence of the Divine Will. The unconditioned will of Deity is considered the fountain-head of all energy.

III. MATTER IS EMBODIED THOUGHT.

This theory, which gives rise to pantheism in its various forms, regards matter as the ceaselessly varying, ever-living garment of the Almighty; and persists in asserting that God has no conscious existence outside of, over and above, nature. It prides itself in its antiquity, reminding us that ancient religious hymns conceive of the world as the robes of the Divinity, from whose ponderous body all things are produced. We need not trouble the reader with an attempted refutation of pantheism.

Those who deny the existence of a God, the Creator of all things, have not as yet satisfactorily answered the question, Whence came matter? though they have presented the world with some bold speculations, some captivating rhetoric, some splendid exhibitions of man's disposition to form generalizations, and a little reasoning that seems on the surface quite plausible.

IV. "GOD CREATED ALL THINGS OF NOTHING BY THE WORD OF HIS POWER."

To this theory it has been objected:—

i. It is inconceivable. "Ex nihilo nihil fit"—from nothing, nothing can come—is a self-evident proposition, and should be accepted as such by every human being. The only production of nothingness is nothing. No substance, material or immaterial, can come into being from the non-existent. There are two fundamental principles in science,—no substantive entity, whether corporeal or incorporeal, can cease to exist, though it may pass through an indefinite number of changes; nor can it come into existence from nothingness, even by the aid of omnipotent power and omniscient intelligence. The axiom, "Ex nihilo nihil fit; in nihilum nil posse reverti"—from nothing, nothing can come; to annihilation, nothing can be reduced—is to be taken not merely as announcing that no effect can occur without an adequate cause, but as affirming that absolute creation and absolute annihilation are inconceivable, and consequently are of course impossible even to limitless power and infinite intelligence. They who accept the hypothesis of an uncreated and consequently self-existent, eternal God, are compelled to concede that even with Him there are impossibilities. He cannot lie. He cannot make the three angles of a triangle equal to less or more than two right angles; nor the square of the hypotenuse of a right-

angled triangle else than equal to the sum of the squares of the other two sides; nor two and two anything else than four; nor wrong right; nor can He annihilate space, or duration, or the relations between abstract numbers.

2. That God created all things out of nothing is not asserted in Scriptures. With the exception of the first verse there is no diversity of opinion in reference to the interpretation of the first chapter of Genesis. The word "bara," "create," elsewhere than in the first verse, confessedly means to form or fashion from pre-existing materials. "God created [bara] great whales"—it is not assumed that He created them from nothing. "God created [bara] man in His own image;" that is, "The Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul" (Gen. i. 21, 27; ii. 7); his body and his soul were fashioned from substances previously existent. The word "bara" elsewhere in Scripture does not mean to originate *de novo*. "Create in me a clean heart." "I form the light and create darkness." "I make peace and create evil." "I create the fruit of the lips" (Ps. li. 10; Isa. xlvi. 7; lvii. 19). It is not meant that "a clean heart," "darkness," "evil," and "the fruit of the lips" are "created" by an Almighty Divine Will from nothingness.

Certainly there was such a thing as progress in creation, that is, in the formation of the earth, and in the production of vegetable and animal existences. Through a protracted period of time the earth was in preparation to become the dwelling-place of man. "The earth was without form and void; and darkness was upon the face of the deep; and the spirit of God moved upon the face of the waters." After furnishing this account of the method in which the earth was formed, the sacred his-

torian proceeds to recount the successive steps in mediate creation, the production of light, of an enveloping atmosphere, of continents and oceans, of vegetable organisms, of animal existences, finally of man—a progressive work upon pre-existing materials. By what right, therefore, do any assume that "create" in the first verse means bringing instantaneously into existence from nothingness by a simple fiat of the Divine Will? Why adopt an interpretation which exacts belief in that which is inconceivable, absolute creation? Since the Bible affirms, "In thy book all my members were written, which in continuance were fashioned, when as yet there was none of them," though man is capable of reproduction; since God is frequently represented as being the Maker of all that the earth, the air, and the sea produce in each recurring season, though they are results of secondary causes resident in existing substances,—why adopt an hypothesis which renders it difficult for those possessing a scientific turn of mind to accept the Bible as a supernatural revelation? Better acknowledge that the creeds, which so positively affirm that God created all things out of nothing, are human inventions based upon an erroneous interpretation of the Word.

It is argued: The cosmogonies of Scripture, which are three in number, and are, as Mr. George Smith affirms, closely related to those of Babylon—in arrangement, in the introduction of God speaking, in the notion of a primeval chaos, in pronouncing everything "very good," in the assignment of stars as determining the years, etc.,—were uniformly interpreted by the Jews till the Hellenic period, not as teaching that all things were made from nothing, but as affirming that God fashioned existing things from pre-existing substances. It is true that the Aryan cosmogony, as found in the Avesta, attributes the

creation of all things to Ahura-mazda (Ormuzd), not from pre-existing materials, but from nothingness. Are we to remain, till the end of time, the besotted dupes of those who lived ere the dawn of science?

It is further said: Even if it is impossible to reconcile the first chapter of Genesis with the facts of science, still we are not called upon to surrender faith in Scripture. We merely surrender the theories of verbal and plenary inspiration. The Bible is a spiritual book and addresses itself to man's spirit. Its assertions regarding scientific facts may be radically erroneous, frequently are: this does not invalidate the inspired spiritual truths which are taught and were designed to be taught. If the first chapter of Genesis, scientifically considered, is fundamentally wrong, it is not necessarily untrue. The lessons it teaches are eternally true. It announces spiritual principles; the Unity of the Godhead; the Divine Will the source of all things terrestrial; everything "good" is of slow growth; the world is advancing, the lower giving place to the higher; the turmoil of the present will be succeeded by the sabbatic rest of the future; to-day's labor brings to-morrow's recompense; man, weak and sinful as he is, is fashioned in God's image.

3. The doctrine that in the dawn of time an Eternal God created that which had no existence in eternity, is inconsistent with the true idea of Deity. Absolute creation supposes a distinction between will and power, between determination and efficiency. In God there is, and can be, no distinction between essence and attributes, between ability and actuality. The assumption that things began to exist implies a change in God from an inactivity, stretching backwards into eternity, to an activity originating in time. If things external to Him owe their existence to His will, they must be regarded as an

eternal effect. "In the beginning" means from eternity. The earth and the heavens are an eternal creation. Accordingly, Origen, while attributing the beginning of the universe to the volition of God, maintained, nevertheless, that it was eternal. The same opinion has been held by many eminent theologians and metaphysicians. It is common to all monists, or those who maintain that there is only one substance in the universe. Some theologians, even some who are regarded as strictly orthodox, concede that God and the universe are so intimately and necessarily interblended that the latter must have existed from eternity.

In the judgment of many, these objections are sufficiently refuted by saying:—

I. We have no right to assume that we can understand the Almighty unto perfection. Because it is impossible for man to make "something" from "nothing," or because it is regarded by some as inconceivable—being beyond the reach of finite comprehension that Omnipotence could create a universe from "nothingness,"—it does not follow that there is any impossibility, not even that there is any strong improbability, in God's creating *ex nihilo*,—from nothing,—the material element or elements from which He subsequently formed the world and all things therein.

Besides, to say that God created all things from nothing is an unfortunate and unwarrantable mode of expression. It simply affirms that there was no objectivity which He transmuted into worlds. It does not lay emphasis on the fact that His will is infinite in power, that there is subjective efficiency adequate to the production of any effect which He determines to produce, that, being an unconditioned First Cause, neither time, nor space, nor number, nor matter was a necessary condition to the

exercise of His omnipotent will. "He spake and it was done." No cause, save His own fiat, was necessary: no condition, save His own existence, was needed. Everything is an effect of His illimitable power brought into exercise by His own irresistible will. Absolute personality, an eternally self-existent, self-conscious, self-sufficient Being,—this is the primal conception in the Biblical account of creation. Consequently, though, as we are prepared to admit, the original expressions employed in the Mosaic cosmogonies yield no conclusive results, we are nevertheless justified in affirming: (*a*) Absolute creation was an act to which God was determined by no necessary existences extraneous to Himself; (*b*) It was an act to which He was determined by no inherent necessity of His own nature. He willed to create; beyond that we cannot go. He was just, because He willed to be. He was good, because He willed to be. He approved right and condemned wrong, because He willed to do so; not from any necessity external to His own moral nature, otherwise He would not be worthy of worship, for compelled goodness is not deserving of praise. It thus becomes apparent that His own unconditioned will must be the source of everything. That which is objective to self may be necessary to the conception of finite personality, but it cannot be necessary to the conception of absolute or infinite personality. Deity needed nothing external to self to render Him self-complete. His unconditioned power, brought into exercise by His unconditioned will, was the efficient cause of whatever has been, is, or shall be. His continued existence was the cause of time. His omnipresence was the cause of space. His unity was the cause of number. His will was the cause of the primordial elements, and of their attributes. His will determined the forms into which He should fashion these original elementary substances.

Perhaps, however, theists act more wisely in imitating the example of Prof. J. Clerk Maxwell. He says, *Encyc. Brit.*, art. "Atom":—

"Science is incompetent to reason upon the creation of matter itself out of nothing. We have reached the limits of our thinking faculties when we have admitted that because matter cannot be eternal and self-existent, it must have been created. It is only when we contemplate, not matter in itself, but the form in which it actually exists that our mind finds something on which it can lay hold."

"That matter, as such, should have certain fundamental properties, that it should have a continuous existence in space and time, that all actions should be between two portions of matter, and so on, are truths which may, for aught we know, be truths of the kind which metaphysicians call necessary. We can use our knowledge of such truths for purposes of deduction, but we have no data for speculating on their origin."

Antecedent to the present arrangements of nature, there was nothing, says the scientist; for advanced science has repudiated the idea of an endless succession of phenomena by proving that everything in the present universe must have had a beginning, thereby rendering it probable that the primordial elements could not have been eternal. Yes, says the theologian; prior to the existing order of things, which indeed runs back into the buried past, there was nothing extraneous to Deity save the necessary results of His own existence. Space was, because God was. Duration was, because God was. Number was, because God was. Justice was—in Deity. Law was—in Deity. Power was—in Deity. Goodness was—in Deity. Holiness was—in Deity.

"In the beginning" there were atoms, says the scientist. Yes, responds the theologian; for God created them in the beginning of the succession of changes which the universe has undergone. In eternity, God: naught else.

"In the beginning" force was, says the scientist.

Yes, says the theologian; force by the divine fiat was associated with matter. All forces have their origin in the Divine Will—they are simply an expression of His determinations.

2. The account of creation, as presented in the Bible, is inconsistent with the assumption that “create” (*bara*) uniformly means “to form,” “to fashion.” Clarke, Lange, Parkhurst and Delitzsch, no mean authorities, assert that “*bara*” means to originate *de novo*. Others, as Pusey, Kitto, and Abenezra, affirm that it may mean either immediate creation or mediate creation—either *creatio prima, immediata*; or *creatio mediata, formativa*. “By the word of the Lord were the heavens made” (Ps. xxxiii. 6). “By Him were all things created, that are in heaven, and that are on earth, visible and invisible . . . all things were created by Him and for Him; and He is before all things, and by Him all things consist” (Col. i. 16, 17). The expression “all things” includes the original element—everything save God Himself. There could, therefore, have been no pre-existing substance, no primordial elements.

Besides, the world—indeed everything extraneous to Deity—is said to have had a beginning. “Of old hast thou laid the foundations of the earth: and the heavens are the work of thy hands” (Ps. cii. 25). “Before the mountains were brought forth, or ever thou hadst formed the earth and the world, even from everlasting to everlasting, thou art God” (Ps. xc. 2). Christ speaks of the glory He had with the Father before the world was. All things, then, had a beginning; and since no mention is made of pre-existing matter from which things terrestrial were formed, they must have been created *de novo*. Moreover, since God is infinite, everything must have originated in His volition; since He is unconditioned,

everything must be dependent upon Him. Absolute creation is a corollary from the demonstrated theorem, An extra-mundane God exists. Consequently, unless we are prepared to concede "that God created, or made of nothing, the world and all things therein," the substance of which it is composed included, we are logically driven to adopt either atheism or some form of pantheism.

By many eminent lexicographers it is asserted that "ayth," a word found in Genesis i. 1, means "very substance," "real essence." If this is its meaning, the verse may be translated: "In the beginning God brought into being (bara) the essence (ayth) of the heavens and the earth."

In no case, if the testimony of the most distinguished scholars has any weight, are we unauthorized in asserting that the verse may affirm, and most probably does affirm, that God created matter *de novo*, by a simple volition.

3. If God does nothing, and has done nothing, except what He did in eternity, then there is no such thing as divine interposition. If there is no distinction between ability and actuality, between power and efficiency, then cause and effect are identical: there can be no unexpended cause. If the purpose of an eternal God is exactly equivalent to the eternal consummation of that purpose, then everything that occurs in time must either have occurred in eternity or must be independent of the will of Deity. So far as its effect upon our lives is concerned, we may as well avow ourselves atheists, as to adopt the theory that there is no distinction between power and efficiency, that what God is capable of doing, and all He ever purposed to do, or can purpose to do, must have been done from eternity. If we are to believe that because God had the power and the purpose to create, therefore creation must be eternal, then we are

forced to conclude that since what shall happen to us to-morrow could not have happened in eternity, therefore it must be independent of the Divine Will.

Nor is change in God a legitimate inference from the current theory that material things had a beginning. It is not asserted that there was any change in His purpose, but simply that His purpose was consummated in time. An eternal purpose to create is not an eternal creation; nor is the creation of the world in time conclusive evidence that the original purpose was to create it from eternity, which purpose was changed into that of creating it in time. The statement that He purposed from eternity to create is by no means identical with the statement that He purposed to create from eternity; and to assert: If the universe is not eternal, God must have been inactive prior to creation,—is a gratuitous assumption that activity must produce the same class of effects. “Who by searching can find out the Almighty unto perfection?” There are limits to human reason. God is confessedly unfathomable. His existence and His essential attributes may be known, however. The ultimate source of all being, all power, all life, is inscrutable—past human comprehension. “Christ is the visible image of the Invisible God.”

The above line of reasoning, though sufficiently powerful in the minds of many to remove all objections to the accepted doctrine of creation, is considered inadequate by others, even by many speculative theologians. To the question, Whence came matter? they prefer to answer:—

V. MATTER IS AN EFFLUENCE FROM DEITY.

This theory, as is evident, may exist under two forms—

1. Matter may be regarded as a necessary and uncon-

scious emanation from the divine nature. In this aspect, the theory may easily glide into pantheism or into a kind of evolution which cannot be regarded as theistic.

2. Matter may be regarded as an effluence from Deity, produced by the exercise of His own will. It is, as it were, the self-evolved fringings of His own eternal substance; the visible manifestation, self-willed, of an invisible, incomprehensible, and otherwise unknowable spirit; the outer, self-unfolded, effluent, and probably eternal robes of His infinite, omnipotent, omniscient, and unconditioned personality.

It is in the latter sense that the theory is held by the authors of *The Unseen Universe*, by the Rev. Joseph Cook, by Sir Wm. Hamilton, and others.

The authors of *The Unseen Universe* say:—

“This production was, as far as we can judge, a sporadic or abrupt act, and the substance produced—that is to say, the atoms which form the material substratum of the present universe—bears, from its uniformity of constitution, all the marks of being a manufactured article.”

“The argument is in favor of the production of the visible universe by means of an intelligent agency residing in the invisible universe.”

“But again, let us realize the position in which we are placed by the principle of continuity—we are led by it not only to regard the invisible universe as having existed before the present one, but the same principle drives us to acknowledge its existence in some form as a universe from eternity.”

“As far as we can judge the visible universe—the universe of worlds—is not eternal, while, however, the invisible universe is necessarily eternal.”—*The Unseen Universe*, pp. 155, 156, 174.

Rev. Dr. Joseph Cook affirms:—

“It is not my opinion that everything was created from nothing. . . . I suppose Almighty God evolves the seen universe of matter and the unseen universe of finite force from Himself. My creed is the reverse of pantheism.”—*Lectures on Heredity*, pp. 120, 121.”

“Matter is an effluence of the divine nature, and so is all finite mind, and thus the universe is one in its present ground of existence and in the Final Cause. In a better age, science, lighting her lamp at that Higher Unity, will teach that although He, whom we dare not name, transcends all

natural laws, they are, through His Immanence, literally God, who was, and is, and is to come. Science does this already for all who think clearly."—*Biology*, p. 270.

Sir Wm. Hamilton employs the following language:—

"But if you can thus conceive neither the absolute commencement nor the absolute termination of anything that is once thought to exist, try, on the other hand, if you can conceive the opposite alternative of infinite non-commencement, of infinite non-termination. To this you are equally impotent."

"But what is a creation? It is not the springing of nothing into something. Far from it:—it is conceived, and is by us conceivable, merely as the evolution of a new form of existence, by the fiat of the Deity. Let us suppose the very crisis of creation. Can we realize it to ourselves, in thought, that the moment after the universe came into manifested being, there was a larger complement of existence in the universe and its Author together, than there was the moment before, in the Deity Himself alone? This we cannot imagine. . . . All that there is now actually of existence in the universe, we conceive as having virtually existed, prior to creation, in the Creator."

"Change must be within existence: it must be merely of phenomenal existence. Since change can be for us only as it appears to us—only as it is known by us; and we cannot know, we cannot think, a change either from non-existence to existence, or from existence to non-existence; the change must be from substance to substance: but substances, apart from phenomena, are inconceivable, as phenomena are inconceivable apart from substances. For thought requires as its condition the correlatives both of an appearing and of something that appears."—*Hamilton's Metaphysics*, pp. 549, 553, 692.

God evolved all things out of His own eternal self-existent substance. To pass from the conditioned to the unconditioned—from finite conceptions to infinite conceptions—is beyond the power of the human intellect. In the backward stretch we must stop somewhere; and though it is the duty of the scientist to remove the First Cause to a distance as remote as possible; and though it is the duty of the theologian to prove that, however distant may be the pavilion in which He hides Himself, His existence is an eternal fact, evidenced by the growing grass and by the falling sparrow—it is possible for the scientists and the theologian to rest in this as an ultimate

fact in reference to the origin of matter,—It is an effluence from the Infinite One.

Evidences are already accumulating, however, that even if theology should content herself in the acceptance of this theory, science would not. Boscovitch and others rid themselves of the idea that matter is substance or stuff, regarding it as merely a phenomenon of force. For the solid vortex-atom of Lucretius, and for the mobile vortex-atom of Thomson and Helmholtz, they substitute a geometrical point, *a center of energy*.

If it shall be proved that matter is a simple and necessary phenomenon of force, and that consequently it needs no other originator, being as really a phenomenon of force as extension and weight are phenomena of matter, then the theist is prepared to assert, and to prove, as we believe, that force is the simple exponent of an Infinite Personal Will, and is increatable, indestructible, inaumentable, and indiminishable. Of course, if it is impossible to create matter or to annihilate matter, and consequently impossible to either augment or diminish its quantity, it is certainly no less impossible to create or annihilate force, and therefore impossible to either increase or lessen its sum. Consequently, the First Cause, an Unconditioned Will, is all and in all. There is but one mystery, the existence of God: all other mysteries resolve themselves into this.

CHAPTER XIV.

CONTINUITY.

HAVING endeavored to ascertain what is the remotest principle in the order of analytic thought, and having shown, as we apprehend, that it is, and must be, the Unconditioned Will of Deity, we now address ourselves to the following questions:—

I. From the initial act of absolute creation has there been a continuous, uniform progression, or have there been occasional breaks, creative epochs, new beginnings?

II. Admitting that the general continuity is a necessary result of the continued operation of physical causes, how are we to account for the “new beginnings”?

There was a time in the remote past, scientists tell us, when the chaotic materials which ultimately formed the solar system were but an undivided portion of those material elements which pervaded immensity. Was there no break in continuity when a definite portion of these began to evolve into the existing solar system? What force separated them from the limitless ocean of matter?

There was a time when the earth had as yet no individual existence, its elements being an indistinguishable part of the heaving sea of homogeneous matter which filled the space now occupied by the solar system—at least an equal space, not the same, for the system in its totality is moving incessantly,—a space whose diameter is five billions of miles. Was there no break in con-

tinuity, when a section of this mass set up for itself? What new force came into operation? or how came pre-existing forces to differentiate?

The earth, or rather the material which was to form it, was as yet in a gaseous state. Was there no break in continuity as it passed into a molten mass? Was this a simple result of the loss of heat? Are gases condensed into red-hot masses as they cool down?

Whatever answer physicists may give to these and similar questions, they concede that this gaseous state was incompatible with life, as was also the succeeding or molten state.

Gradually, the surface of this mass became sufficiently cooled to permit the condensation of vapor into water. In the lapse of ages continents emerged from the previously shoreless ocean. By degrees they became fitted to sustain vegetable life; still, no plant existed, not even a lichen. The sun poured down its rays upon treeless plains and shrubless mountains. The rain watered barren wastes. The rivers flowed onwards between verdureless banks to an untenanted ocean. The air was incessantly moving in currents and counter currents, but no winged creature, bird or insect, sported itself therein. A lifeless world!

A time came, however, when the surface was teeming with vegetable life—plants existing of almost countless varieties, “each yielding seed after its kind.” What agencies produced this change? Was there no break in continuity, no new beginning when vegetable life appeared? What force produced it? Did matter evolve it? Was a germ wafted to the earth from some other world, the difficulties connected with separate creations being removed by the origination of one living organism capable of communicating life to the universe? They who

are disposed to answer either of these questions in the affirmative are logically forced to concede that there has been a break in continuity, a thing apparently inconceivable unless there is a Personal Will back of nature. That force should originate life, or that matter should, is at variance with the uniform testimony of experience that life is invariably from pre-existing life.

As yet no animal existed, not even a moneron on an ocean-bed. Gradually the earth became fitted to sustain this form of life—millions of years being needed for the transformations. In time, lo, earth and air and sea, are teeming with myriads of living creatures, swarming everywhere! What agencies produced these changes? Whence came animal-life? Was it evolved from vegetable existences? Was it generated spontaneously in the laboratories of nature? Did it fall from some adjacent planet? Again, there must have been a break in continuity.

Though life was rolling over the earth in swelling billows, like the waves of a ceaselessly agitated ocean, there were no human beings, no intelligent personalities possessing “dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing.” Lo, the scene changes, and man exists: he is toiling, hating, loving, fearing, hoping, dying! By what agencies was this change effected? Was man evolved from the monkey? Again, there has been a break in continuity.

Prof. Huxley says:—

“It has ceased to be conceivable to any person who has paid attention to modern thought, that chance should have any place in the universe, or that events should follow anything but the natural order of cause and effect.”

We have, therefore, the authority of Prof. Huxley for the assertion that these sudden leaps could not have occurred

by chance, but must have been produced by some adequate cause or causes. Certainly the chasms to which we refer are broad: from a homogeneous, nebulous material, pervading all space and subject to a certain number of forces, to a definite part of that nebulous material, restricted to a limited portion of space and subject to new laws, as it must have been, since it proceeds to the formation of a planetary system; from a homogeneous mass diffused through a sphere whose diameter is billions of miles to a portion of that mass set aside for the formation of a world and impressed with new laws; from a gaseous condition to a molten state; from a molten state to a condition favorable to plant life; from the inanimate to the animate, an immense abyss; from vegetable life to animal life; from mere animal life to rational life;—seven great changes which look like new beginnings, like epochs, some of them like creative epochs. What cause or causes produced them? To this question atheistic evolution has given the following answers:—

i. The changes were effected by purely physical causes. By these, and without the direction or superintendence of Divine Power, the universe was evolved from “stardust,” and the solar system was subsequently evolved in its present form. To the question, How came matter to assume vegetable and animal forms? it is responded, Such forms, or at least one parental form, must have been produced by spontaneous generation; for, as Prof. Huxley affirms, “If evolution is true, the living must have arisen from the not-living.” To the inquiry, What agency produced subsequent transmutations in the vegetable and animal kingdoms? several answers have been given: (*a*) the use or disuse of the parts of the living organism, superinduced by environment; (*b*) changed conditions of life acting directly upon existing varieties; (*c*) an inherent

tendency to variation; (*d*) natural selection operating in conjunction with the intense struggle for existence and resulting in improvement, since only the fittest to survive could survive.

All the changes, according to this theory, are sufficiently accounted for by simply saying, Physical causes produced them; for, as it can be shown that many of the transmutations have certainly been effected by purely physical forces, it is safe to assume that all have, as science is making rapid strides in successfully proving.

Prof. Tyndall says:—

“Those who hold the doctrine of evolution are by no means ignorant of the uncertainty of their data, and they yield no more to it than a provisional assent. They regard the nebular hypothesis as probable; and in the utter absence of any evidence to prove the act illegal, they extend the method of nature from the present into the past, and accept as probable the unbroken sequence of development from the nebula to the present time”—*Fragments of Science*, p. 166.

It is only claimed that “the unbroken sequence of development is probable.” Is it not quite as probable that “the unbroken sequence” has been broken once at least, at the origination of life, if not indeed many times? And if it has been broken but once, then physical causes are an inadequate explanation; and it is conceded by nearly all evolutionists that they do not explain the origination of matter, nor the origin of life, nor self-consciousness, nor the sense of personal identity, nor the distinction between the automatic and the volitional nerves of the brain. If it is certain that the law of continuity has been broken, then is it highly probable that physical causes are an inadmissible explanation. It becomes probable, from the concessions of atheistic evolutionists themselves, that a Personal Will is needed to account for these sudden and apparently causeless breaks.

2. These changes are effected by the intelligence

resident in nature itself, intelligence being an invariable attribute of matter. The extreme difficulty, not to say impossibility, of believing that mindless causes could produce intelligent results has induced some to adopt this view—anything sooner than admit the existence of a Personal God. They affirm that, as in vegetable and animal germs there is a something, an intangible, imponderable life-principle, which intelligently selects means for the accomplishment of a fixed purpose—choosing from earth, air, and water, the elements needed for growth,—so is there in nature an intelligence which chooses agencies adapted to the production of results manifesting what we denominate intelligent design, a principle of life is inherent in nature.

The advocates of this theory, at least some of them, are disposed to concede that mind and matter are distinct substances; but they maintain that neither exists or can exist, except in union with the other,—distinct, but inseparable.

This theory with its variations, may be regarded, we presume—if the evolution theory is itself an evolution—as an improved variety of the ancient theory which regarded water as holding all things in solution and as rendered pregnant by an organizer educed from the abysmal waste of agitated waves. The evolution of all things, through agencies many and breaks not a few, is under the superintendence of an intelligence evolved from that heaving ocean of matter which needs a superintendent,—the need creating the supply.

Possibly we have mistaken the original form of this hypothesis. Perhaps it is a descendant of the theory held by the ancient Phoenicians, Egyptians, Chinese, and others, that the origin of all things was a primeval egg, containing a principle of life, from which everything has been

hatched by heat. If all conceivable conjectures as well as all exploded absurdities, all possible speculations as well as all existing theories, were potentially in this primeval egg, awaiting the heat of discussion to bring them out, may we not fear that if speculation goes on a few million years more, the universe will be flooded with theories—will in fact be converted into an impalpable, imponderable, invisible, unfathomable, unknowable, unconditioned, incomprehensible, indestructible, infinite “mist”—“fire-mist” once again? Begin anew.

Theistic evolution solves the difficulties connected with abrupt changes, violent breaks, and new beginnings, as follows:—

I. Creation is by derivation. There is a succession of changes, most of which are regular, orderly, and gradual, though some are abrupt, sudden, and inexplicable except on the hypothesis of a Divine Personality. For each class of changes provision has been made by Infinite Intelligence,—all changes occur in accordance with pre-ordained, divinely sustained, eternal forces. “In the beginning” matter was diffused throughout the universe in an extremely attenuated state. It possessed, imparted to it by a Personal God, the same forces which it possesses at present. Under the operation of these, and beneath the superintendence of Divine Wisdom, all changes have been effected, the smallest having been pre-arranged.

According to this view the nebular hypothesis is a plausible and probable explanation of the manner in which God formed the planets of the solar system from pre-existing materials, and furnishes an intimation, not only of the way in which other celestial bodies were probably formed, but also of the manner in which world-materials were produced and aggregated from an infinitely

diffused "star-dust," which in its elementary condition must have been an effluence from His own eternal substance or the direct creation of His Omnipotent Will. To the question, What is the origin of life? it answers: God, by derivative creation, called into being one primordial germ, or at most a few germs. To the question, Whence came the various species of plants and animals? it responds: They are results of creation by derivation—God chooses to create in this way. It is this form of evolution which is gaining ground among theologians. It is ably presented by Owen and Mivart.

Those who are unwilling to accept the nebular hypothesis, even when in theistic dress, may argue:—

(a) How came the nebulous material to be in such an intensely heated condition? No matter can go out of one condition into another without an adequate cause. It is not fair to assume, contrary to the testimony of all experience, that the world-material was so intensely hot. You have no right, simply that you may secure an hypothesis which will apparently account for the facts, to put into it anything more than our knowledge of nature warrants.

(b) What has become of all this heat? What has become of all the heat which, according to the hypothesis, has been radiated during the period of five billion years, since the nebulous mass became condensed into worlds? The system, it is said, is cooling, cooling continually. What becomes of the heat? Prof. Tyndall says, "It is wasted." Prof. Proctor says that "only the one two hundred and twenty-seventh of the one millionth of all the heat from the sun reaches any planet; the remainder passes into space and is lost." But nothing in the universe is ever wasted—nothing is ever lost. Heat is force, and force, like matter, is indestructible. All

the heat therefore that has ever been in the universe must be in it still. It only changes its place, or changes its form. Into what other force has it been transformed? Where is it? If it has passed to other systems, it is fair to assume that as much force in some form has come to this system from other systems. If not, then it can only be because other planetary systems are cooler than this, which has not been proved, and cannot be. Forces tend to equilibrium.

Besides, electricity is convertible into either light or heat. Sunlight is not heat—it only becomes heat by being absorbed by matter. That which comes forth from the sun as electricity may become light, heat, magnetism, or chemical affinity, according to circumstances; and that which comes forth from the sun in force of one form, ought to return thither in force of some form—at least it is legitimate to presume that this is so until it shall be proved that either space or adjacent planetary systems are robbers, and robbers who are so intensely covetous that they are still unsatisfied though they have been pilfering from this insignificant solar system for unnumbered billions of years. No: in the universe, one part does not steal from another. If it takes what it needs, it invariably gives an equivalent. It could not otherwise get what it needs.

(c) The materials of the earth are not arranged according to density, as they should be, if the nebular hypothesis furnishes an explanation of the mode of its construction. There is a liquid sea of molten material in the center. The solid rock should have been at the center, the earthy material above it, then flowing lava, then air.

(d) Since more heat is required to fuse some metals than is needed to fuse others, and since some metals are

heavier than others, how does it happen that in many instances the less weighty and the easily fusible are embedded in the more weighty and the less fusible? Gold is embedded in granite.

(e) There is no positive proof that there ever was a nebulous mass; and the presumption is that there never was, for many supposed nebulæ have been resolved, by the powerful telescope of Lord Rosse, into planetary systems.

(f) The hypothesis does not furnish a satisfactory explanation of the motions of the heavenly bodies.

(g) The hypothesis makes a large number of almost incredible assumptions: (a) the nebulous mass was heated to such an extent that all metals were in a gaseous state; (b) the homogeneous mass, while in the process of cooling, managed to produce an almost infinite number of heterogeneous results, a large number of different substances in each of three distinct states, the solid, the liquid and the gaseous; (c) all the heavenly bodies were formed from nebulous matter; (d) the entire mass was rotating, though no satisfactory cause of this motion is assigned; (e) this motion was more and more rapid, and the increasing rapidity was due to the process of cooling and contracting; (f) the ellipticity of the orbits in which all celestial bodies move is satisfactorily explained by the hypothesis.

2. The second solution of these changes, as explained by theistic evolutionists, is what is denominated creative evolution—there is an immanent supernatural power, so operating and adjusting natural forces as to evolve designedly all changes, even those at present inexplicable, in a regular, gradual, uninterrupted order. According to this view, all transmutations in the vegetable and animal worlds, and all cosmical changes as well, result

by design from natural causes in which God is immanent; and never result from anything else than natural causes, and always in a graduated series which presents no breaks, though there are what we are disposed to denominate breaks. Jevons remarks, in his *Principles of Science*: "If occurrences can be designed and foreseen by a human artist, it is surely within the capacity of the Divine Artist to provide for similar changes of law in the mechanism of an atom, or the construction of the heavens."

Those who are indisposed to accept the theistic form of evolution, and consequently are inclined to repudiate both the above explanations, generally express themselves as believers in the immanence of the Divine energy in what are called the physical forces, which forces are incessantly operative, and produce a graduated, regular, unbroken series of effects; occasionally, however, God through higher forces—which are of course natural, though unusual—or by the direct exercise of His Omnipotent Will causes great and otherwise inexplicable advances in the ordinarily slow progress of improvement. Such special intervention is indispensably necessary, it is affirmed, in order to account for what may be very properly regarded as new beginnings,—the origination of matter, the commencement of life, the origin of man, etc. Most of His operations in nature, for example, the production of varieties, of closely allied species, etc., are carried on through the ordinary physical forces, and are indirect and gradual; some of His operations, indeed many, though few comparatively, are by forces unknown to us and unknowable, if indeed they are distinguishable from His will.

CHAPTER XV.

FORCE.

IN reference to force the following opinions are entertained by advanced thinkers:—

- I. In its essence it is indefinable and unsearchable.
- II. In its origin it is spiritual—it is the immanence of the Divine Will in nature.
- III. It is immaterial—and is probably a substantial entity.
- IV. It is convertible—one force can be converted into any one of the other forces.
- V. It is indestructible—no force has been or can be annihilated.
- VI. It cannot be evolved from matter, unless it has been previously involved therein.

I. FORCE, LIKE MATTER, IS IN ITS ESSENCE UNKNOWN AND UNDISCOVERABLE.

It is not possible to determine all its properties. Some of its laws may be adduced; not all, however, can be. An enumeration may be made of certain forces that are operative on earth, throughout the solar system, and probably to the remotest limits of the universe, even in regions beyond the penetrating gaze of the most powerful telescope; but there may be forces in the world of which we can have no knowledge—of course, such may have potency in the untrodden pathways of immensity. The correlation and conservation of the physical forces

is an established fact. Light, heat, electricity, magnetism, and chemical affinity are intimately related. Each can be converted into any one of the others; but it does not follow that either can be transformed into some other force, if any other exists. These several forces may be only different modes in which the Divine Will manifests itself: it may possibly manifest itself in other modes, however. As is generally believed, they may be immaterial in their nature, and certainly are incapable of being recognized as any specific form of matter. It is conceivable, nevertheless, that they may be an unknown form, as different from any known form as platinum is different from ether. It is this conviction which has led to their being designated as "Imponderables," the design being to express the opinion that they were destitute of at least one material property—they were not subject to gravitation. They are regarded, moreover, as incapable of annihilation. This furnishes no warrant, however, for the assertion that they cannot be destroyed even by Omnipotence; much less that they cannot be held in abeyance by the Divine Will. The premises will not sustain a conclusion so sweeping. Reasons may be assigned, it is true, for believing that no force can be annihilated by any power inherent in the system itself: beyond this, assertions should be made with extreme caution. A universal conclusion from premises that are not universal is not a necessary inference, however plausible it may seem. Again: that no force can be evolved from matter unless it has been previously involved in matter is self-evident, and bears with irresistible weight against every atheistic form of evolution; still, it must not be understood as implying that nothing can come from any material cause, except what was communicated to it at creation. Omnipotence can communicate new energies from, through, or indepen-

dent of, existing forces. Atheistic evolution is illogical, for it assumes that matter may acquire new forces, evolving what was not involved. Theistic evolution permits us to believe that Divine Energy may be communicated at any time through new channels or through existing channels. It insists, however, that force cannot be evolved, unless it has been previously involved, either mediately or immediately.

Of the many definitions of force—all of which are open to objections—we prefer that of Prof. Mayer: "Force is that which is expended in producing or resisting motion." This single sentence is ample evidence that its unfortunate author—whose overtasked powers suffered a temporary eclipse, and whose fame became a target for the arrows of envy—was endowed with rare intellectual powers, such as are the inheritance of but few. It evinces a deep insight into the mysteries of nature, great power of generalization and profound thought. Though his most ardent admirers—who are many and are among the most learned of the age—are by no means unanimous in the belief that he has furnished a logical definition of force, since he has not designated in unmistakable language either the genus or the differentia of the term, having merely told us what force does, not what force is; still, he seems clearly to intimate as much respecting its nature as is known at present, indeed as much, perhaps, as will ever be known. It is a something which expends itself, exhausts itself, in motion or in the resistance of motion.

Does the definition, as it is called, encourage us in regarding force as a material entity? We think not; for, as a cause must continue to exist in the effect it produces; and as it has not been proved that a purely material cause can produce an immaterial effect, matter being

incapable of producing thought; and as in this case the effect is simple motion, or the simple resistance of motion, each of which is purely immaterial,—we may infer that the definition does not justify us in regarding force as a material entity. We speak of a material force, it is true; we mean no more, however, than a force which is manifested in connection with matter, as indeed all forces are so far as we know, though the connection is less apparent in some cases than in others. When our attention is specially directed to the visible matter in which the force inheres we designate it a material force. Matter is not force, nor can it annihilate itself in becoming motion. It cannot annihilate itself in resisting motion. It cannot produce motion. It cannot annihilate motion. It is absolutely powerless. An ivory ball rebounds if thrown upon a marble slab. It is not the material constituting the slab which caused the rebound, but force resident in the slab. Convert the marble slab into gas and the ball will not rebound from its surface. If force expends itself in producing or resisting motion, then force is immaterial. It could not otherwise expend itself, practically annihilate itself, in producing that which is unquestionably immaterial. Matter is indestructible. It may change its form. It cannot cease to be. Motion is not matter. If the latter can transmute itself into motion, it can annihilate itself. Nay, it can do more—it can re-create itself; for motion can be transmuted into heat, a force; and if force is matter then matter is a self-creation, or, what is virtually the same thing, is an effect of an immaterial cause. If heat is matter, and if, as cannot be denied, motion may be converted into heat, then immateriality can originate materiality, that is, an immaterial cause can produce objectivity without anything from which to manufacture it. As we are repeatedly assured

that an Omnipotent Personal Will cannot create matter *de novo*, we are justified in concluding that absolute creation cannot be an effect of motion, nor of any one of the physical forces. Consequently, this definition of Dr. Mayer, as is evident from the tenor of his writings and from the conclusions of modern science, is not to be understood as consistent with the assumption that force is a material entity.

Does the definition justify us in regarding force as simply a mode of motion? No: for that could not be regarded as a mode of motion which produces every movement covered by the term motion, since that would be equivalent to saying that a mode of motion produces all motion; *i. e.*, produces itself first, then every other mode of motion. Further, it would be a virtual declaration that resistance to motion is a mode of motion; *i. e.*, force annihilates force: and yet we are assured that force is indestructible. If then force is a mode of motion which produces or resists motion, it must be capable of creating and annihilating itself an indefinite number of times.

Does the definition assume that force is an entity? It is difficult to view it otherwise; for it characterizes force as capable of producing all the motion in the universe. Is it conceivable that such a stupendous effect should flow from anything less than an entitive existence? As force, after exhausting itself in motion, can be reconverted into force, it seems natural to regard it as an entity. Heat, after being transformed into motion, can be re-transformed. Light can be converted into heat and back again into light. Electricity can be transmuted into magnetism or into chemical affinity, indeed into any one of the physical forces, and be converted back to electricity. Force, then, must be an immaterial entity.

It is difficult to accept the theory of some scientists, that physical force is not an entity of any kind whatever. It seems inconceivable that heat, though capable of producing measureless effects, should be simply an irregular agitation in an intervening medium.

Again: that light should be merely an undulation in a hypothetical luminiferous ether, not a substantial entity, appears a severe tax on human reason. Light can be decomposed into the seven primary colors and the separated rays can be recombined, forming white light. Each of the seven colors has a wave-length of its own. Each, like the undivided ray, can be reflected and the laws of reflection scientifically stated. Each can be refracted and the laws of refraction accurately determined. Light is refracted as it passes from one medium to another of greater or less density. It can be polarized, the polarized ray being thereby made to assume qualities different from those of an ordinary ray. The polarization can be effected by reflection, by single refraction, or by double refraction. Light is diffracted, or bent, as it passes the edge of a material substance, being subject, as Sir W. Thomson says, to magnetic influence. It differs in quality according to the nature of the illuminating body, every elementary substance, when in a state of incandescence, having a spectrum peculiar to itself; indeed, the quality of light is affected by the surface from which it is reflected. Light can be absorbed, the heat imprisoned in coal-fields being only absorbed sunlight. Its rays can interfere with each other, causing dark lines in the spectrum. It can produce chemical action, blackening chloride of silver, rendering transparent phosphorus opaque, fading vegetable colors, combining hydrogen and chlorine gases when mixed, etc. A theory which assumes that waves may

consist of vibrations at right angles to the line of direction, and that in polarized light, though the intensity is the same, the vibrations are in the plane of polarization; which asserts that this wave-disturbance is unaltered in kind and in amount as it proceeds, however far it travels, being never broken up into irregular vibrations, never diminished in amount, never changed in character; which declares that all bodies have the property of exciting vibrations, each body exciting a vibration having a wavelength peculiar to that body, thus producing light of different colors, and giving its own shading to every object; which seems to suggest that the effect produces its cause, for it affirms that the different colors of light are due to the lengths of the undulations—red light being caused by a long undulation and violet by a short undulation, though it would seem more natural to say that the lengths of the undulations were caused by the color of the light, not the color of the light by the lengths of the undulations; which, before it can furnish an explanation of a single phenomenon of light, demands a second hypothesis (a pure conjecture), that a luminiferous ether pervades all space and all substances—an extremely subtle elastic fluid if some phenomena are to be explained, an incompressible solid if other phenomena are to receive a satisfactory explanation, though the ether whether a fluid or a solid is uninfluenced by gravitation; which affirms that this luminiferous ether transmits vibrations in a perfectly unimpaired condition through transparent substances—transmitting them as readily as through space—and communicates vibrations within all substances, even within the densest;—such a theory, to say the least, is not as satisfactory as might be desired.

One may be indisposed to question the theory that light is transmitted in a succession of waves, while he

yet respectfully suggests that a something to transmit seems requisite to transmission.

Nor is the theory that the several physical forces are mere modes of motion, any more satisfactory as applied to electricity, magnetism, and chemical affinity. That these have no substantial existence is as inconceivable as that light has no such existence.

In its essence, then, force is undiscoverable and indefinable.

To the second accepted tenet of advanced science attention is now directed.

II. FORCE IS SPIRITUAL IN ITS ORIGIN.

In the opinion of many reasoners, "the testimony of science strongly favors the assumption that force is the omnipresent energy of a Personal God. This theory regards natural law as the stated or ordinary method in which God chooses to operate in nature, as in fact the supernatural operating with such unvarying uniformity as to create the impression that possibly these laws are independent of the will of a supramundane Deity. The natural is simply the supernatural rendered familiar by the frequency with which we are permitted to note its presence. The supernatural is the natural striking us with surprise because of the infrequency with which we are afforded an opportunity of observing its manifestation."

That force originates in spirit, not in matter, is the theory of Dr. W. B. Carpenter, of Sir John Herschel, of Louis Agassiz, of Dana, of Beale, of Grove, of Joule, of Liebig, of Faraday, of Mayer,—of a host of eminent authorities in the scientific, the metaphysical, and the theological world.

Dr. Carpenter says:—

"In regard to the physical universe it might be better to substitute for the phrase government by laws, government according to laws; meaning thereby

the direct exertion of the Divine Will, or operation of the First Cause in the forces of nature, according to certain uniformities which are simply unchangeable, because having been originally the expression of Infinite Wisdom, any change would be for the worse. . . . Will is that form of force which must be taken as the type of all the rest. . . . Force must be regarded as the direct expression of will. . . . When science, passing beyond its own limits, assumes to take the place of theology and to set up its own conceptions of the order of nature as a sufficient account of its cause, it is invading a province of thought to which it has no claim. To set up these laws as self-acting, or as either excluding or rendering unnecessary the power which alone can give them effect, appears to me as arrogant as it is unphilosophical.”—*Mental Physiology*, chap. xx.; *Human Physiology*, p. 542; also art. *On Mutual Relation of Vital and Physical Forces*, p. 730, etc.

Sir John Herschel affirms:—

“It is but reasonable to regard the force of gravitation as the direct or indirect result of a Will or Consciousness existing somewhere.”

Dr. Lionel S. Beale says:—

“It has been affirmed that all the phenomena of living matter are due to the operation of the same laws which govern the non-living world. But of these supposed laws absolutely nothing is known, and there is nothing absurd or contrary to fact, though it may not be in accord with the prophetic spirit of materialism, in the view that these powers of living matter are utterly different from any known inorganic forces, and have nothing whatever to do with them. *They may have emanated from power, instead of being matter-born.* They may even require, for their existence, constant supervision of power, for aught we can prove to the contrary, and they may have been created and may be sustained by creative power, instead of being a mere form or mode of created force, *itself another but very different product of creation.* . . . As I am compelled by the facts of the case to admit that some peculiar non-physical agency influences, in a particular manner, material particles and their forces, it seems to me by no means unreasonable on the part of the physiologist to assume the existence and activity of an energy perhaps related to vitality, but of a yet higher order, capable of influencing, controlling and directing not only living power, but all matter and all forces of whatever kind.”—*Protoplasm; or Matter and Life*, pp. 298, 358.

Prof. W. R. Grove asserts:—

“Although the word cause may be used in a secondary and concrete sense as meaning antecedent forces, yet in an abstract sense it is totally inapplicable; we cannot predicate of any physical agency that it is abstractedly the cause of

another; and if, for the sake of convenience, the language of secondary causation be permissible, it should be only with reference to the special phenomena referred to, as it can never be generalized. . . . When we study physical phenomena it becomes difficult to separate the idea of causation from that of force and these have been regarded as identical by some philosophers. . . . If we regard causation as invariable sequence, we can find no case in which a given antecedent is the only antecedent to a given sequent. . . . The common error, if I am right in supposing it to be such, consists in the abstraction of cause, and in supposing in each case a general secondary cause—a something which is not the first cause, but which if we examine it carefully, must have all the attributes of a first cause, and an existence independent of, and dominant over, matter. . . . In all phenomena the more closely they are investigated the more are we convinced that, humanly speaking, neither matter nor force can be created or annihilated, and that an essential cause is unattainable. Causation is the will, creation the act, of God.”—*Correlation of Physical Forces*, pp. 15, 16, 18, 199.

Dr. J. R. Mayer says:—

“The first cause of all things is Deity—a Being ever inscrutable by the intellect of man; while higher causes, supersensuous forces, and the rest, with all their consequences, belong to the delusive middle region of naturalistic philosophy and mysticism. . . . Force and matter are indestructible objects.”—*Correlation of Physical Forces*, p. 341.

We may add the testimony of the Duke of Argyll:—

“We know nothing of the ultimate nature or of the ultimate seat of force. Science, in the modern doctrine of the conservation of energy, and the convertibility of forces, is already getting something like a firm hold of the idea that all kinds of force are but forms or manifestations of some one central force issuing from some one fountain-head of power. . . . And even if we cannot certainly identify force in all its forms with the direct energies of one omnipotent and all-pervading Will, it is at least in the highest degree unphilosophical to assume the contrary—to speak or to think as if the forces of nature were either independent of, or even separate from, the Creator’s power. . . . Whatever difficulty there may be in conceiving of a will not exercised by a visible person, it is a difficulty which cannot be evaded by arresting our conceptions at the point at which they have arrived in forming the idea of laws or forces. . . . It is perfectly true that the mind does recognize in nature a reflection of itself [its own personality]. But if this be a deception, it is a deception which is not avoided by transferring the idea of personality to the abstract idea of force, or by investing combinations of force with the attributes of mind. . . . We need not be jealous, then, when new domains are claimed as under the reign of

law—an agency through which we see working everywhere some purpose of the Everlasting Will."

"It is impossible to suppose that they [forces] stand in the same relation to the Will of the Supreme [that they do to us]; yet it seems as if he took the same method of dealing with them—never violating them, never breaking them, but always ruling them by that which we call adjustment or contrivance . . . And what is contrivance but that kind of arrangement by which the unchangeable demands of law are met and satisfied? It may be that all natural forces are resolvable into some one force; indeed in the modern doctrine of the correlation of forces, an idea which is near to this, has already entered the domain of science. It may also be that this one force, into which all others return again, is itself but a mode of action of the Divine Will. But we have no instruments whereby to reach this last analysis."—*The Reign of Law*, pp. 122, 123, 125, 127.

"The laws of nature," says John Stuart Mill, "do not account for their origin." "The scientific mind," says Tyndall, "can find no repose in the mere registration of sequences. The further question obtrudes itself with resistless weight, Whence came the sequences?" Wallace asserts, "If we have traced one force, however minute, to an origin in our own will, while we have no knowledge of any other primary cause of force, it does not seem an improbable conclusion that all force may be *will-force*, and thus the whole universe is not only dependent on, but actually is the will of higher intelligences, or of a Supreme Intelligence."* Spencer himself concedes that "The force by which we ourselves produce changes, and which serves to symbolize the cause of changes in general, is the final disclosure of all analysis; . . all other modes of consciousness are derived from our consciousness of exerting force."†

III. FORCE IS IMMATERIAL—and is probably a substantial entity.

That force is immaterial, whatever its origin may be, is the opinion of a majority of the ablest scientists. It is

* *Natural Selection*, p. 368.

† *First Principle*, p. 235.

the theory of Prof. R. W. Grove, who, in his essay on the *Correlation of Physical Forces*, affirms and re-affirms his conviction that they are not matter. It is the opinion of Dr. J. R. Mayer, one of the keenest intellects that ever essayed the task of furnishing the world a solution of nature's mysteries, and who has the honor of being the author of the theory of the correlation and conservation of forces; the opinion of Dr. Carpenter, of Prof. Joule, of Dr. Ferrier, indeed of all leading scientists. Even Bain and Tyndall believe in the immateriality of force, for they define matter as a double-faced unity having two sets of properties, the material and the spiritual.

There are those, it is true, who regard each force as an attenuated kind of matter; heat, as a material substance whose molecules are arranged in a particular way; gravitation as attenuated threads of infinitely divisible matter; electricity as a subtle fluid pervading everything; light as infinitesimal atoms from incandescent bodies; magnetism as a substance developed by currents of electricity; sound as corpuscular emanation from a vibrating body.

It is only fair to acknowledge that these views have had able defenders. Newton and La Place believed in the corpuscular theory of light, and the authority of these eminent scientists long prevented the scientific world from adopting the truth. The demolition of the once prevalent belief in the materiality of heat is a comparatively recent conquest of science. Formerly, the most illustrious physicists accepted the materialistic theory. Gravitation was conceived of by Newton as attenuated threads of matter. This is made apparent in his *Third Letter to Bentley*, a portion of which was quoted on page 193.

Until a recent date electricity was regarded by many as a subtle material fluid. Prof. J. Clerk Maxwell, at the end of his *Treatise on Electricity and Magnetism*, presents an admirable summary of the theories which have prevailed in reference to the nature of electricity. Those which regarded it as a material substance are looked upon as exploded hypotheses.

Though Pythagoras, 2500 years ago, presented the world with the undulatory theory of sound, still there have been able advocates of the corpuscular theory, which regards sound as minute particles of matter thrown off from bodies when vibrating—possibly from all the molecules of every kind of matter when subjected to vibratory movements; especially if the movements are rapid and the checks sudden.

Nor is the doctrine of the materiality of the forces confined, as might seem probable, to those who entertain materialistic conceptions of the universe. It can enumerate among its advocates profound theologians and able defenders of the dogma of a Personal Infinite Will, of a Being spiritual in His nature, unconditioned in His volitions, eternal in His existence. This was emphatically true in former times, and is true, to some extent, even yet. Reasoners of this class made a broad distinction between the physical forces on the one hand, and vital, mental, and spiritual forces on the other. The former are associated with matter and may be matter-born; the latter are connected with life and are spiritual in their origin, immaterial in their nature, and capable, within limits, of controlling, directing and governing the physical to the accomplishment of definite purposes.

Although the dynamic theory, as now entertained, furnishes a cogent argument in favor of the probability that there is an infinite immaterial Personality and that

there are finite existences ceaselessly active and necessarily immortal, it is not the only armory from which weapons can be obtained against atheism. Even though it were successfully proved that the forces of nature were material, it would still remain true that the difference between mind and matter is radical. Their properties are diametrically opposite.

It is safe to affirm, however, that the preponderance of testimony, especially of the scientists of the present day, favors the accepted theory that the forces of nature are immaterial. As an evidence of this—and without troubling the reader with an enumeration of the experiments made in reference to each of the physical forces, and without recapitulating the arguments based thereon—authorities may be quoted, a few from many.

"Scientific inquiries are becoming less and less questions of matter, and more and more questions of force; material ideas are giving place to dynamic ideas. While the great agencies of change with which it is the business of science to deal—heat, light, electricity, magnetism, and affinity, have been formerly regarded as kinds of matter, imponderable elements, in distinction from other material elements, these notions must now be regarded as outgrown and abandoned, and in their place we have an order of purely immaterial forces."—Edward Youmans, M. D., *Correlation and Conservation of Forces*, p. 12.

"I think the phases of thought which physical philosophers have gone through, will be found generally such as I have indicated, and that the gradual accumulation of discoveries which have taken place through the most recent periods, by showing what effects can be produced by dynamical forces alone, is rapidly tending to a general dynamical theory into which that of the imponderable fluids promises ultimately to merge."—Prof. W. R. Grove, *Correlation of Physical Forces*, p. 104.

Let these two quotations suffice as a general statement. Are they sustained by facts? Let us see. In the presentation of testimony upon this point, two limitations are imposed: (a) the extracts shall be from authors whose standing in the scientific world is such that their assertions carry conviction with them, or at least impose

upon those who are disinclined to accept them the task of refuting the theory recommended, and of establishing one that commends itself by being in accord with recognized facts; (*b*) in order that the testimony may have more weight, it shall be restricted to specific statements—an opinion expressed in reference to each one of the so-called physical forces,—heat, light, electricity, magnetism, affinity.

HEAT.—“Let us divest the mind of the impression that heat is in itself anything substantive . . . Heat thus viewed is motion . . . Heat is a communicable expansive force, . . . a communicable molecular repulsive force . . . This difficulty [why it is not as correct to say that heat is absorbed by motion as to say that it is produced by motion] ceases when the mind has been accustomed to regard heat and cold as themselves motions, *i. e.*, as correlative expansions and contractions, each being evidenced by relations and being inconceivable as an abstraction . . . Though I am obliged, in order to be intelligible, to talk of heat as an entity, and of its conduction, radiation, etc., yet these expressions are, in fact, inconsistent with the dynamic theory, which regards heat as motion and nothing else. . . . We only know certain changes of matter, for which changes heat is a generic name; the thing heat is unknown.”—Prof. W. R. Grove, *Correlation of Physical Forces*, pp. 40, 51, 53, 48, 55, etc.

“We know heat to be a mode of motion and not a material substance . . . As long as the truth or falsity of the materialistic hypothesis seemed an open question, the word caloric was held to imply the materiality of heat.”—Sir Wm. Thomson, *Encyc. Brit.*, art. “Heat.”

“The most probable assumption [in reference to the nature of heat] is, that it is a motion of the particles of matter.”—Dr. Faraday, *Conservation of Force*, p. 370.

“It is hardly necessary, he [Rumford] remarks, to add that anything which any insulated body or system of bodies can continue to furnish without limitation cannot possibly be a material substance; and it appears to me extremely difficult, if not quite impossible, to form any distinct idea of anything capable of being excited and communicated in the manner that heat is excited and communicated in these experiments, except it be motion . . . This Joule has done [has proved that the same amount of heat can in the end be always produced when the same amount of energy is expanded] and his experiments conclusively prove that heat and energy are of the same nature, and that all other forms of energy with which we are acquainted can be transformed into an equivalent amount of heat.”—Wm. Garnett, *Encyc. Brit.*, art. “Energy.”

"We, on the contrary [he believes in the immateriality of heat but does not regard it as simply a mode of motion] are rather inclined to infer that before it can become heat, motion—whether simple or vibratory, as in the case of light and radiant heat, etc.,—must cease to exist as motion."—Dr. J. R. Mayer, *The Forces of Inorganic Nature*, pp. 257, 346.

In the opinion of the last mentioned author, and as well in that of many others, there is in current scientific discussions a needless and perplexing confusion of motions and forces. Motion must have force to produce it; the latter is the exponent of the former. "Force," in the language of Sir John Herschel, "is whatever causes a body to exist under a given condition or whatever changes any of its relations; whatever tends to keep a body what it is, or whatever tends to make it different in any respect from what it is." Force, in its essence, is confessedly unknown. We can investigate its tendencies: we can do no more. It tends to produce motion, to modify motion, to prevent motion. Consequently, many prefer to regard forces as substantial entities, accepting the celebrated definition of Dr. J. R. Mayer, "Force is that which is expended in producing or resisting motion." Force is not simply motion.

The above quotations, however, even those which represent heat as a mode of motion, answer the purpose for which they are introduced. They prove that advanced scientists deny the materiality of heat. That is all we desire. Heat is an immaterial force. That it should be proved to be a substantial entity, and not mere motion, is not necessary to our proposed argument.

The dynamic theory of heat is adopted by Joule, Carnot, Rumford, Rankine, Clausius, Helmholtz, Dana, Thomson, Mayer, Faraday, Grove, Liebig, Maxwell,

and Youmans,—by nearly all scientists of the present day.—Heat, then, may be regarded as an immaterial force.

LIGHT.—“This theory [the corpuscular] gave way to the undulatory one, which is generally adopted in the present day, and which regards light as resulting from the undulation of a specific fluid to which the name of ether has been given, which hypothetic fluid is supposed to pervade the universe and to penetrate the pores of all bodies. . . . I stated that it appeared to me more consistent with known facts to regard light as resulting from a vibration or motion of the molecules of matter itself, rather than from a specific ether pervading it . . . If it be admitted that one of the so-called imponderables is a mode of motion, then the fact of its being able to produce the others, and be produced by them, renders it highly difficult to conceive some as molecular motions and others as fluids, or undulations of an ether. . . . The above facts—and many others which might have been given—go far to connect light with motion of ordinary matter.”—Prof. W. R. Grove, *Correlation of Physical Forces*, pp. 123, 132, 133.

“This [the fact that the velocity of light in water is to its velocity in air as 3 to 4, and not as 4 to 3, as demanded by the corpuscular theory] finally disposed of the corpuscular theory; though it had been conclusively disproved long before by certain interference experiments. . . . The true author of the undulatory theory is undoubtedly Huygens [1678]. . . . It was not until 1815, and subsequent years, that, in the hands of Fresnel the undulatory theory finally triumphed. This is the only theory left possible by the experiments of Foucault.”—Prof. P. G. Tait, *Encyc. Brit.*, art. “Light.”

We need not multiply quotations. Nearly all scientists concede that light is immaterial though not all accept the theory that it is an undulation in a luminiferous ether. Prof. J. Clerk Maxwell, for example, though a firm believer in the immateriality of light, defends what he denominates an electro-magnetic theory of light. The unanimity with which modern scientists regard light as immaterial is the only point upon which emphasis is laid.

ELECTRICITY.—“The early theories regard its [electricity’s] phenomena as produced either by a single fluid idio-repulsive, but attractive of all matter, or else as produced by two fluids, each idio-repulsive, but attractive of the other. . . . I think I shall not be unsupported by many who have attentively studied electrical phenomena, in viewing them as resulting, not from the action of a

fluid or fluids, but as molecular polarization of ordinary matter, . . . the current being nothing else than this molecular transmission of chemical affinity . . . electricity would appear to consist in transmitted chemical affinity. . . . Electricity is that affection of matter or mode of force which distinctly and beautifully relates other modes of force."—Prof. W. R. Grove, *Correlation of Physical Forces*, pp. 83, 84.

"If the universe be delivered over to the undisturbed action of its physical processes, all force will finally pass into the form of heat."—Prof. H. L. F. Helmholtz, *Interaction of Natural Forces*, p. 229.

As he deems it impossible that matter should cease to exist; and as he regards heat as immaterial; and as he considers electricity one of the physical forces, carrying on the "physical processes" of the universe,—it is evident that he believes in the immateriality of electricity.

MAGNETISM.—"Magnetism . . . will produce electricity, but with this peculiarity—that in itself it is static; and therefore, to produce a dynamic force, motion must be superadded to it: it is in fact directive, not motive, altering the direction of other forces, but not in strictness initiating them. . . . Magnetism will directly affect the other forces, light, heat and chemical affinity, and change their direction or mode of motion. . . . The same arguments which have been submitted to the reader as to the other affections of matter being modes of molecular motion are therefore applicable to magnetism."—Prof. W. R. Grove, *Correlation of Physical Forces*, pp. 142, 145, 151.

The expression "modes of motion," as applied by Prof. Grove to these several forces, is not to be interpreted as an unqualified denial on his part that forces may be substantial entities. He carefully guards himself against making any such denial. He says:

"They [the physical forces] have no commencement which we can trace. We must ever refer them back to some antecedent force equal in amount to that produced, and therefore the word initiation cannot in strictness apply, but must be taken as signifying the force selected as the first; this is another reason why the idea of abstract causation is inapplicable to physical production."

CHEMICAL AFFINITY.—"We have arrived at a knowledge of the consistency of magnetism with electricity, and also of chemical action and of heat with all the former: and if we see not the consistency between gravitation with any of these forms of force, I am strongly of the mind that it is because of our ignorance only."—Dr. Faraday, *The Conservation of Force*, p. 376.

"Those who admit the possibility of the common origin of all physical force and also acknowledge the principle of conservation, apply that principle to the sum total of the force. . . . There may be but one cause . . . convertible in its manifestations."—*Idem*, pp. 380, 381.*

IV. FORCE IS CONVERTIBLE.

As already intimated, forces may assume new forms. Push, applied to an immovable body, produces heat, the amount being proportioned to the amount of pressure. Push applied to a movable body produces motion. The body in motion, if arrested, becomes heated; *i. e.*, motion, when arrested, is converted into heat, this being a continuation, under another form, of the force which impelled the projectile. If two bodies are rubbed together, heat is generated. If the surfaces are smooth, and especially if they are oiled, being thereby rendered incapable of arresting much motion, the quantity produced is small. If the surfaces are rough, more is generated, because more motion is arrested. In every case, the amount is proportioned to the amount of friction in the impinging bodies, and is a continuation of indestructible force, and consequently is capable of re-conversion into motion. The heat underneath the boiler of a locomotive is converted into motion; a part re-appears at the axles of the wheels as heat, which immediately begins to produce molecular motion in the heated parts.

Whatever may be the character of the bodies, the same amount of heat is generated provided the same amount of force is arrested, though in many instances, especially in the case of gases and fluids, it is impossible

* Of the above extracts, those from Grove, Helmholtz, Mayer, and Faraday are from the expositions of these gentlemen as compiled by Dr. E. L. Youmans under the title *The Correlation and Conservation of Forces*. Consequently, the references are to pages in that volume, and not to pages in the original, separate treatises.

to determine this, owing to the fact that heat is dissipated. In the case of elastic bodies, where a part of the force is continued in re-action, proportionally less is generated. With some singular exceptions, bodies when compressed become heated; when dilated, become cooler, imparting their heat to neighboring bodies.

The heat generated by motion, or rather by the force producing motion, may be converted into light, into electricity, into magnetism, or into chemical affinity—indeed each form may perhaps be always present, though with varying intensity. It is conceded that we rarely, if ever, witness the operation of a single force in isolated form. Each force is accompanied by an equal opposite force, acting in the same straight line. The conception of a single force is an abstraction. Hence Sir Wm. Hamilton says, "And of second causes, I say, there must almost always be at least a concurrence of two to constitute an effect." The several physical forces, being secondary causes, seldom act singly, perhaps invariably occur in combinations, two or more.

The convertibility of the physical forces may also be seen if we begin with heat instead of motion. The former produces the latter; indeed, Prof. Grove defines it as a molecular repulsive force antagonistic to attraction and communicable to all bodies in contiguity. Heat expands the body which absorbs it, causing molecular motion; and the body so expanded has the power of expanding all bodies in proximity. Dr. Mayer affirms, "Heat and motion are transformable one into the other. . . . I have characterized the relation which forces bear to one another by saying that they are different forms under which one and the same object makes its appearance."* Dr.

* "Remarks on the Mechanical Equivalent of Heat," E. L. Youmans' *Correlation and Conservation of Forces*, pp. 323, 346.

Faraday says, "We have arrived at a knowledge of the consistency of magnetism with electricity, and also of chemical action and heat with all the former."* Prof. W. R. Grove declares, "Heat, . . . which is capable of producing motions directly, is also capable of producing electricity, magnetism, and chemical affinity. . . . The primary tendency of heat, it is true, is antagonistic to both magnetism and chemical affinity. By its secondary action, however, it produces both. . . . Radiant heat is light."†

In like manner, if we begin with electricity, the several forces can be produced. Science, which is not yet prepared to deny that the friction of homogeneous bodies produces electricity, is bold in asserting that the friction of heterogeneous bodies generates it accompanied usually by heat, light, magnetism (a force acting at right angles to electrical currents), and chemical affinity. Possibly it would be correct to say that the other forces accompany electricity. Be that as it may, electricity can generate heat. It can produce light. It can produce magnetism. It can cause mixed gases to unite. If a current of electricity is passed through oxygen and hydrogen gases, they unite and form water; if passed through air, nitric acid is generated.

Light, as an initial force, is capable of producing the other forces, either meditately or immediately. Prof. Grove says, "Thus [by experiment with a beam of sun-light] we get chemical action on the plate, electricity circulating through the wires, magnetism in the coil, heat in the helix, and motion in the needles."‡ All the forces, in one experiment, from a ray of sun-light! Light then is convertible into any one of them.

* "Conservation of Force," E. L. Youmans' *Correlation and Conservation of Forces*, p. 376.

† *Correlation of Physical Forces*, p. 177.

‡ *Idem*, p. 177.

In like manner, by starting with magnetism, each of the others can be generated. In proof of this statement a brief quotation will suffice. "Magnetism can, through the medium of electricity, produce light, heat, and chemical affinity. . . . Magnetism will directly affect the other forces, light, heat, and chemical affinity, and change their direction or mode of motion, or, at all events, will so affect matter subjected to these forces, that their direction is changed." *

The convertibility of the forces which are operative in inorganic nature is a well established fact. No one, so far as known, is disposed to call it in question. Its establishment is one of the triumphs of science. Dr. Mayer, the author of the theory, has a title to an immortality of fame.

The same correlation and conservation are supposed to exist between the forces operative in the organic world. The forces which are resident in living structures are convertible *inter se*. This portion of the subject will merit attention when treating of Life and of Mind. Meanwhile, the convertibility of the physical forces may be regarded as an established fact.

V. FORCE IS INDESTRUCTIBLE.

The cause is always equal to its effects—"causa æquat effectum." In a connected series of causes and effects, no term and no part of any term can become equal to zero. An effect must correspond with, and be equivalent to, its antecedent cause or causes, and must in turn become a cause adequate to the production of a subsequent effect or effects equal to itself. If a cause, *a*, produces an effect, *b*, equal to itself, and *b* produces an effect, *c*, equal to itself, and *c* produces an effect, *d*, equal to itself, and so on in regular succession to *z*; then *z* equals *a*; *a* still

* *Correlation of Physical Forces*, p. 144.

lives in z . If the succession were infinite, the last factor would be an exact equivalent to the first. If a produces two effects, b and c , equal to itself; and b and c each produce two effects, d and e , f and g , the two former unitedly equal to b , and the two latter unitedly equal to c ; and if d , e , f , g each produce two effects, h and i , j and k , l and m , n and o , there being in each two-fold effect the exact equivalent of its cause; then, h , i , j , k , l , m , n , o , however they may differ among themselves, are together equal to a . No force has been annihilated. A force which exhausts itself in producing an effect or effects loses its identity, but does not cease to be. If it has exhausted itself in part, it subsequently exists partly in its effect, and partly in its unchanged identity. If it has exhausted precisely one-tenth of itself in producing twenty effects, then the remaining nine-tenths may be unchanged, and the one-tenth still continues to exist in its twenty effects. No force has been lost. If the nine-tenths subsequently produce, either instantaneously or through a protracted period, one hundred effects, each differing from the other both in its nature and in the measure of force requisite to its production, still no portion of the original force has been annihilated. It continues in its effects, which are themselves causes of succeeding effects. The stream of cause flows on undiminished, and may be regarded as a series of effects dependent upon an Eternal First Cause, or as a succession of secondary causes which must have originated in an Efficient Primal Force. Nor is the case altered when we contemplate a cause acting in conjunction with one or more other causes and exhausting itself in producing ten thousand effects, in each of which it has had a different measure of efficiency; for, though we may be unable to recognize its exact equivalent in the

new forms assumed, we are impelled alike by reason and by the deductions of modern science to conclude that the initial force has not been destroyed. Blended with other forces, it still lives in ten thousand effects.

The indestructibility of force is taught by the talented Dr. J. R. Mayer, by Prof. Helmholtz, by Dr. Faraday, by Prof. Grove, by Prof. Liebig, by Dr. Carpenter, by Tyndall, Joule, Thomson—by nearly all scientists of the present day. Prof. W. R. Grove says, “In all phenomena the more closely they are investigated the more are we convinced that, humanly speaking, neither matter nor force can be created or annihilated, and that an essential cause is unattainable.”* Prof. J. Clerk Maxwell says: “The total energy of any body or system of bodies, is a quantity which can neither be increased nor diminished by any mutual action of these bodies, though it may be transformed into any one of the forces of which energy is susceptible.”† Prof. Helmholtz affirms: “No portion of force can be absolutely lost.”‡ Prof. Faraday declares: “The strict science of modern times has tended more and more to the conviction that force can neither be created nor destroyed. . . . Let us not admit the destruction or creation of force without clear and constant proof.”§ Dr. W. B. Carpenter asserts: “As force is never lost in the inorganic world, so force is never created in the organic. . . . Plants restore to the inorganic world not only the materials, but the forces at the expense of which the vegetable fabric was constructed.”|| It is the opinion of Prof. Liebig that,

* See Youmans’ *Correlation and Conservation of Forces*, p. 199.

† *Encyc. Brit.*, Art. .

‡ Youmans’ *Correlation and Conservation of Forces*, p. 227.

§ *Idem*, pp. 359, 378.

|| *Idem*, pp. 420, 433.

"If a power could be annihilated, or in other words, have *nothing* as its effect, then there would be no contradiction involved in the belief that out of *nothing* also power could be created." * Sir Wm. Hamilton affirms, "*Omnia mutantur; nihil interit*, is what we think, what we must think. . . . We think the causes to contain all that is contained in the effect; the effect to contain nothing which was not contained in the causes. . . . We are unable, on the one hand, to conceive nothing becoming something,—or on the other, something becoming nothing. . . . In thought, causes and effects are thus, *pro tanto*, tautological; an effect always pre-existed potentially in its cause; and causes always continue actually to exist in their effects. There is a change of form, but, we are compelled to think, an identity in the elements of existence. . . . What is now considered as the cause may at another time be viewed as the effect; and *vice versa.*" †

VI. FORCE CANNOT BE EVOLVED FROM MATTER, UNLESS IT HAS PREVIOUSLY BEEN INVOLVED IN MATTER.

Heat, light, electricity, and magnetism may be eliminated from a lump of coal. They are not coal, nor any product of coal. Force is not matter. The heat of the coal is, science tells us, absorbed sunlight—force treasured up in convenient form, and ready for man's use. Amber, if rubbed, gives off electricity. Though not matter, it must have been involved in it, or it could not have been evolved from it. The flint, if struck, emits a spark. The light must have been imprisoned therein. These forces, if incapable of existing antecedent to and independent of matter, must be regarded as its invariable attendants; in which case, the latter must be viewed as

* See Youmans' *Correlation and Conservation of Forces*, p. 388.

† *Metaphysics and Logic*, pp. 533, 691.

a concomitant of the former. We must believe that there is no force without matter, and no matter without force. Whether the latter may or may not exist dissevered from the former, it cannot be evolved from it unless it has been previously involved in it.

CHAPTER XVI.

FORCE VERSUS MATERIALISM.

IN discussing the essence of matter it became apparent that the testimony of science warranted neither an assumption of the eternity of material existences, nor their evolution from nothingness. In the chapter just closed it has been shown that they could not have evolved from physical force, for it is inconceivable that an immaterial, impersonal, unintelligent agent could have originated objectivity. The theory that an Infinite Personality called them into being *ex nihilo*, by the fiat of His unconditioned Will, is encircled with fewer difficulties. Nor can they be regarded as force in repose, a species of congealed energy; for, though force can be eliminated from matter, it is not its transformation. That the two are not identical is evident, inasmuch as the former can be generated from the latter in indefinite amounts; as heat from iron-filings, by friction. They are alike in this, each demands the existence of a Primal Cause to explain its origin and continuance. In other respects they are totally dissimilar.

The essence of force, like the essence of matter, is unknown and indefinable. Consequently, until atheism is able to define its terms, why should it object to the terms, vital force, mental force, and spiritual force, on the ground that these are indefinite and incomprehensible? That they are in measure beyond man's comprehension

is conceded. So also are the terms matter and physical force. To assert that the mysteries of nature are more explicable upon the hypothesis that there is nothing within its domain save these two, does not lead from darkness into light, but from great obscurity into still greater. To solve all the mysteries that environ us is impossible. There is mystery above, beneath, around, within, *everywhere*. Are the enigmas connected with life lessened by affirming: There is no "vital force," all its phenomena being explained by matter and the ordinary forces? Are the intricate problems connected with mental activity explained by affirming: Thought is "molecular vibration" in brain-tissue, resulting from changed physical conditions? If we are forced to employ a term that is partially incomprehensible, is there any advantage in substituting one more general and less understandable for one more specific and less unknowable?

So likewise, under the sanction of the authorities adduced, and of others which might be adduced, we act reasonably in concluding that science does not pronounce against the theory that the universe continues to exist because an Omnipotent Personal Will so decrees; indeed, we are safe in affirming that such a theory is regarded with favor by advanced science. The Divine Will is the infinite energy which produces all effects, each of which, as it streams forth from the fountain of all power, becomes a cause producing effects, though quite manifestly, in the ultimate analysis, there can be only one causal agency—secondary effects and secondary causes being in fact convertible terms. The innumerable forms assumed by what we denominate physical, cosmical, and vital forces are merely the resistless pulsations of Infinite Will-force—effects, though we are accustomed to

designate them causes. Antecedents they are; not efficient causes in the strict sense.

Science, then, acting in its own legitimate sphere, is aiding theology in an unprecedented manner. It is accumulating testimony to the effect that all forces are convertible into one force, a force to which reason is compelled to attribute an intelligent purpose. Scientists, who ought to labor cordially with theologians, are beginning to give us proof, by demonstration, in favor of the reasonableness of faith in a Personal First Cause.

If we do not regard force as having its origin in an Infinite Personal Will, how shall we account for it? It has not been proved to be a child of matter, nor an independent eternal entity. Shall we adopt a theory in reference to the evolution of the forces and affirm: If an individual animal, with all its organs, with its vital energies and its mental faculties, is an evolution from lifeless matter, blindly groping through millions of years after new forms in which to manifest itself; then we may believe that these mysterious forces—correlated, convertible, indestructible, immaterial—have been evolved from some antecedent force, as unlike and inferior to them as man is unlike and superior to the “simplest imaginable organism.” Are we prepared to believe that—as in the vegetable and animal kingdoms—evolutionists may bewilder us with their attempts to trace a line of descent, shadowy though it be, back to “a homogeneous atom” of force? Is it reasonable to conjecture that with two homogeneous atoms, one of plasson and one of force, lying side by side from eternity in the ocean of immensity, there existed the potentialities of a limitless unfolding? And is the hypothesis of a God, then, no longer necessary? The fruitlessness of human effort! After the task has been performed, and everything banished

from the universe except two homogeneous atoms, an infant can demolish the theory, though pronounced rational and harmonious, by simply asking: Father, who put so much into those two atoms?—did God?

My child, you have never studied science. Go play; and let the immaterial sunlight paint roses on your cheeks.

Since, then, there is something in the universe besides matter, *viz.*, immaterial forces, there certainly is no prevenient improbability against the doctrine of a Personal Spiritual God; nor anything unreasonable in the theory that man is a spiritual being and not a mere aggregation of material molecules. If light, heat, electricity, and magnetism, and even gravitation, are immaterial, there evidently is no basis for the assertion: As we know and can know nothing in reference to any existence except that of matter, it is unscientific to believe in an Infinite Spirit and in the immateriality of mind. Such an assertion is in antagonism with the teachings of modern science. This affirms that the most powerful agents in nature are immaterial, and that consequently it is not irrational to believe in the existence of a spiritual First Cause, who may be—we are almost constrained to say, must be—the Fountain-head of all force; nor is it unreasonable to believe that the soul of man is immaterial. Accordingly, every falling stone, inasmuch as it is moving in obedience to an immaterial force, testifies to the possibility of the existence of a Spiritual God, and as well to the probability that mind is immaterial, the will being a real creative force. The flash of lightning that splinters the cedar at my door, since it is not material, burns upon the fragments at my feet the declaration: A God may exist, certainly does exist; the soul may be immaterial, quite manifestly is immaterial—spiritual.

The heat that warms my body, being immaterial, tends to thaw the doctrine of materialism from out my heart. The morning light, which bursts in at my window and paints pictures on the illuminated floor; which imparts color to my cheek and cheerfulness to my spirit; which awakens all nature into activity; inasmuch as it is immaterial, testifies: There is no presumption against the existence of the Great Spirit, no improbability against the doctrine of the soul's immateriality. Both beliefs are rational and may be entertained, if arguments can be adduced in their favor.

Even though the testimony of those who regard forces as substantial existences, real entities, should be ultimately overborne by that of those who regard them as mere phenomena, or as affections of matter, or as modes of motion; still, they unquestionably open the gates of the unseen universe wide enough to afford glimpses of the possibility that there are existences purely spiritual. Consequently, the theist is not called upon to prove them entities. The testimony that they are immaterial answers his purpose. Those who persist in regarding them as "modes of motion" are constrained to concede that they are totally diverse from matter. They are capable of organizing, of building up, of controlling and of decomposing material substances. That which constructs organisms must exist before organization begins, and consequently must have an existence independent of matter. Force, then, which is the only organizer in nature, must have existed prior to matter and consequently independent of it. Reason seems to teach that the First Cause of all things must have been force, a Personal Intelligent Will.

Again: if there must be an antecedent force which constructs a human organism, and if force is immaterial,

what valid objection can be brought against the doctrine of the soul's immateriality? And if this organizing force must exist before organization begins, why may it not continue to exist after the organism has perished? Modern science, which some characterize as atheistic, is beginning to give us transporting visions of spiritual existences and of immortality.

Before leaving this part of the subject, it may be well to remind the reader that the forces of nature must not be so conceived as to annihilate the freedom of the creature, leaving us the helpless puppets of an inexorable physical necessity. No force is annihilated; no force is without power. Consequently, will-force must be something in the economy of nature. This question will be considered more fully, especially in its scientific aspects, in the discussion of Mind and its relations to matter. Meanwhile, we content ourselves with quoting the language of Sir Wm. Hamilton upon this topic:—

“The assertion of absolute necessity . . . is virtually the negation of a moral universe; consequently, of the Moral Governor of a moral universe; in a word, atheism. Fatalism and atheism are, indeed, convertible terms. . . . How the will can possibly be free must remain to us, under the present limitation of our faculties, wholly incomprehensible. We cannot conceive absolute commencement; we cannot, therefore, conceive a free volition. But as little can we conceive the alternative in which liberty is denied, in which necessity is affirmed. And in favor of our moral nature, the fact that we are free, is given us in the consciousness of an uncompromising law of Deity, in the consciousness of our moral accountability; and this fact of liberty cannot be redargued on the ground that it is incomprehensible, for the doctrine of the Unconditioned proves, against the necessitarian, that something may, nay, must be true, of which the mind is wholly unable to construe to itself the possibility, whilst it shows that the objection of incomprehensibility applies no less to the doctrine of fatalism than to the doctrine of moral freedom.”—*Metaphysics and Logic*, pp. 556, 557, 558.

If physical forces are immaterial, there is no presumption against the conception that there may be a vital

force in every organism, distinct from the material of which the organism is composed. The existence of this vital force, which is the organizer of vegetable and animal structures, cannot be said to be an irrational assumption, since it is in accord with what prevails in the non-living universe. It is in perfect analogy therewith. If there are immaterial forces which operate in and through gross, non-living matter, there is no antecedent improbability in the existence of a vital force which operates in and through living organisms. If light, heat, electricity, and magnetism are immaterial, what right have we to say that vital-force, mental-force, and soul-force are material? Evidently, all objections to their being considered immaterial are removed. If reasonable arguments can be presented in favor of such a theory, it may be entertained. The positive argument will be presented in other sections of this volume.

Nor is it less manifest that the doctrine, as announced by scientists, that each of the physical forces is susceptible of conversion into any one of the others, lays a foundation upon which to construct an argument in favor of the current belief that will-force does not need to be something material in order to excite muscular activity. An immaterial cause can produce changes in matter, exhausting itself in the production of these changes. To say that nothing but matter can influence matter is unscientific. My volition can be transmuted into muscular force sufficient to wind my watch. The coiled mainspring, itself an effect of human volitions, now becomes a cause, setting the machinery in motion, and generating heat, though in small measure. Its energy—my imprisoned will—is not expended, however, instantaneously. The construction of the watch—cog-wheels, lever, hands, and balance-wheel, which represent

the will of its maker, are so many allied causes regulating the expenditure of the force communicated by will to the mainspring. When this is exhausted, a fresh supply must be imparted, if the watch is to continue to indicate the hour of the day. My volition can be converted not only into motion, or into heat, but may also be transmuted into electricity, or into magnetism. In obedience to will-force I can walk briskly across the room and by rubbing the soles of my feet along the Brussels carpet can surcharge my body with electricity. By an act of will I can surround myself with a magnetic influence which attracts others or repels them. The orator is a sort of magnetic battery charged at will.

Lionel S. Beale remarks, "Muscles may be made to execute the mandates of the will. Their contractions are governed by mind." This does not prove that mind is matter. It proves that mental force can be converted into muscular force; that the immaterial can govern the material.

It is asserted also, as seen in the preceding chapter, that force is indestructible. If, then, the physical forces are incapable of annihilation, and if, as is affirmed, they are also immaterial, there evidently is no antecedent improbability in the doctrine of the soul's immortality, but an argument from analogy in its favor. If physical force is indestructible, is it not illogical to assert that the soul, a spiritual force, perishes with the body?

If other forces are imperishable, why not this? Is the disintegration of the crystal the destruction of the force that held its molecules together? Is the decay of the plant the annihilation of the forces which builded it up? Is the dissolution of the body an end of the forces which aided in its construction? No. Then why conclude that death ends conscious existence? The physical

forces that leave the crystal, the plant, or the body, are still unchanged in their nature. They exist under new forms. Analogy asserts, Then conscious existence also remains unchanged in its nature. It does not perish, for force is indestructible. It does not become unconscious, being absorbed into the infinite ocean of spiritual being, for forces remain substantially unchanged. They merely assume new forms. But a loss, on the part of man, of the sense of personal identity would be a radical change in the nature of that force which we denominate soul. Analogy warrants us in asserting, The conscious soul may exist under new conditions, may assume new modes of manifesting its activity; annihilated, it cannot be.

If, with the view of blunting the edge of this argument, any materialist is inclined to say, It has not been proved, nor can it be proved, that a physical force either exists, or can exist, dissevered from matter; we answer, It has not been proved, nor can it be proved, that the soul at the death of the body may not construct for itself an invisible material tabernacle. If it constructed for itself a "terrestrial body," may it not also construct for itself a "celestial body"? This at least is true, The gratuitious assumption that the soul, when dissevered from its present body, is in a disembodied condition and must therefore perish, has no cogency against the argument for its continued existence. The unsupported assumptions that the soul is bodiless when it parts from its clay dwelling, and that spirit cannot exist apart from matter, have no weight against the reasoning from analogy that spiritual force is indestructible. Argument is not refuted by counter assumption. Those who accept the doctrines of christianity have as good a right as those who reject them to make conjectures. If it is conjectured that the soul, when it parts from the present body, takes upon itself another,

which may perhaps have been its enswathement within the perishable casket, or if it is assumed that spirit may exist without a material accompaniment, have such conjectures less cogency than those which they antagonize? Apparently, they have more. The former may be supported by reasoning, and is perhaps Scriptural, being possibly the doctrine taught by Paul.* Nor is the second irrational and inconceivable; since, if physical forces are immaterial in their nature and spiritual in their origin, there is no apparent contradiction in assuming that soul-force may exist independent of matter, even though this may not be in accordance with the beliefs of some materialists.

The above line of reasoning is not to be understood as conveying the intimation that material causes are convertible into physical forces. If the cause is matter, the effect must be. Of a physical force, the effect is physical. Force is spiritual and is incapable of being transformed into matter. It is indestructible. Matter is incapable of ceasing to exist. In the burning of coal, force is eliminated; none of the material is transmuted into force. The difference between the two is one of kind, and not merely of degree.

There are certain chasms, broad and fathomless, which materialism has never bridged, and it is reasonably safe to affirm, never will bridge;—the abyss between matter and force, between the not-living and the living, between brain and mind, between the volitional nerves and the responsive nerves. Materialists have labored to expel everything from the universe save matter. They have failed. Some facts refuse to be explained on their hypothesis.

The reader is also reminded that reason impels the conviction that evolution can be no more than the evolv-

* 1 Cor. xiv. 36-54.

ing of what was previously involved. More than this is not evolution, but creation.

Consequently, to suppose that matter could originate force—an evolution without an antecedent involution—is to imagine that an effect can occur without a cause. The body cannot originate soul, though life can construct a material organism. Until it shall be proved that matter can originate force, there will be one crushing argument against the spontaneous generation of life from pre-existing inorganic substances; and after it shall have been proved that it can evolve the physical forces, even though not previously involved, it will remain to prove that it can evolve vital forces which had never been imprisoned in it. "*Vivum ex vivo*," "*vis ex vi*," "*materia ex materia*," may be regarded as established principles, at least so far as reason and observation are able to determine. Before we are at liberty to assume that matter can originate force, either physical or vital, we must prove that an effect does not need to be contained in its cause; that the less can produce the greater; that a material substance, possessing the properties of extension and figure, may produce a something possessing diametrically opposite properties.

The logician can never surrender belief in the doctrine of causation. Wherever he discovers the evolution of force from matter, he knows there must be an evolving agent; and if the evolution is with design, he is certain there must be a designer. He is equally well assured that no evolver, however powerful, and no designer, however intelligent, can evolve that which has not been involved. Possibly man may yet be able to get out of matter all that has been put into it; but it is certain he will never be able to get from it, what has not been put into it. Involution and evolution are equal. This belief is

necessitated by the established doctrine of the persistence of force.

The bearing of these principles upon the doctrine of the evolution of the various species of plants and animals from a few primordial germs is apparent. Original germs could of course only evolve what had been previously involved. Evolution affords no support to atheism. You may unwind the strips of linen from an Egyptian mummy. You will find nothing there but what was put there. Nor can you divest yourself of this conviction, though ten thousand human voices are shouting in your ear: You did not see this corpse wrapped in linen; no living being saw it; no embalmer of the present day can tell you how it was done; it may have been done by "a fortuitous concurrence" of the forces of nature, which have produced marvelous results;—there was no involver. After atheism has succeeded in proving that God has had nothing to do with the world since life throbbed in one little germ, it will find itself confronted with a still more difficult task, the banishment of the involver of that germ from the universe.

CHAPTER XVII.

LIFE AND ITS RELATIONS TO MATTER.

IN order to direct attention more fully to the claims made by atheistic forms of evolution, it is necessary to invite the reader to a consideration of the problems involved in the term Life, and to the solutions given thereto by those who repudiate belief in the being of God. Having journeyed with the uncompromising evolutionist over extended fields,—the origin of man; spontaneous generation; primordial germs; the origin and essence of matter; the nature, relations, and genesis of the physical forces; the law of continuity,—in which fields he has labored with unwearied assiduity, and from which he has brought valuable treasures to the temple of truth; it is necessary to follow him in his investigations into the nature of life. An attempt must be made to furnish answers, probable if not incontrovertible, to the following questions: Is life mere mechanism?—Is life some one of the physical forces?—Is life a mode of motion?—Is life a mere aggregation of the life of an infinite number of infinitesimal bioplasts?—Is life one of the affections of matter, which has two sets of properties, the physical and the spiritual—a double-faced unity?—Is life what Mr. Herbert Spencer defines it, “The definite combination of heterogeneous changes, both simultaneous and successive, in correspondence* with external co-

existences and sequences"?—Is life a substantive entity?—What is the origin of life?

A discussion of these and kindred topics is necessary to an investigation of the relations, friendly and antagonistic, which theistic conceptions of the universe bear to the theory of evolution as advocated by eminent thinkers with an array of learning, with a measure of boldness, and with attractiveness in style, that bewilder the mind and rivet attention even when they do not succeed in securing intellectual assent.

To the question, What is life? various answers have been given. No one of these, however, meets the demands of science, though some are as ingenious as they are elaborate, and as pretentious as they are profound. The term, it must be conceded, is as yet undefined.

With the view of ascertaining the present status of the intricate question, and in the hope of directing attention to the conflicting opinions which prevail, the task is undertaken of examining the more noteworthy attempts that have been made to define the incomprehensible term.

These tentative definitions may be classified, for the purpose in view, under two heads:—

- I. Those which regard life as mere mechanism.
- II. Those which regard it as an immaterial, substantive entity, capable of controlling both matter and inorganic forces.

IS LIFE MERE MECHANISM?

Life has been defined by Haeckel as "a connected chain of very complicated material phenomena . . . of atoms placed together in a most varied manner."*

This may be accepted as a specimen of the definitions

* *History of Creation*, vol. i. p. 199.

furnished by the materialistic school of philosophy. It assumes, as materialism invariably does, that science is competent to assert that there is nothing in the universe except matter and its forces. The latter, modern materialists are disposed to regard as modes of motion. Life, accordingly, must be viewed either as "a particular arrangement of the molecules of matter," or as "one of the modes of motion," a connected series of changes produced by the ordinary physical forces.

Any theory which regards life as "a particular arrangement of the molecules of matter"—an arrangement having such diversities that each species of plants and animals, indeed each individual plant and animal, by virtue of a slightly different arrangement, possesses characteristics differing from those possessed by others—is radically defective. The material and the vital, though frequently united, are two distinct realities; and their mysterious union is more readily explained on the assumption that life is a substantive entity, capable of employing chemical and physical forces in the production and maintenance of an individual material organism, than by assuming that life is a phenomenon of material molecules when arranged in certain ways. The chasm between the living and the not-living is too broad to be bridged by molecular arrangement. To regard life, not merely as an evolution, but as a particular phase of material evolution, furnishes no explanation of the origin of conscious existence; nor is it possible to believe that the will, which is capable of setting the machinery of the individual organism in motion, is the result of a specific arrangement of material atoms. Hence Prof. Tyndall concedes: "The continuity between molecular processes and the phenomena of consciousness is the rock upon which materialism must inevitably split whenever it

pretends to be a complete philosophy of the human mind." He approvingly quotes the language of DuBois Reymond: "It is absolutely and forever inconceivable that a number of carbon, hydrogen, nitrogen, and oxygen atoms should be otherwise than indifferent to their position and motion, past, present, and future." Prior to 1875 Prof. Tyndall viewed materialism as an inadequate explanation of the phenomena of conscious life. Indeed, even Mr. Herbert Spencer, whom materialists would regard as competent authority, concedes that, "The proximate chemical principles, or chemical units,—albumen, fibrine, gelatine—or the hypothetical proteine substance, cannot possess the property of forming the endlessly varied structures of animal forms."

The mechanical theory of life, even when aided by the hypothesis that the universe is pervaded by "mind stuff"—a hypothetical, imponderable, impalpable, exhaustless, invisible material potentiality, having subtle influences discoverable through the microscope of a powerful imagination and filling the interstices between the molecules of the hypothetical ether which is supposed to pervade all interstellar spaces, being extremely mobile, and exceedingly complex in its molecular structure, from the minute particles of which individual organisms are produced by physical agencies, each organism being capable of evolving a definite number of harmonious combinations,—is about as satisfactory an explanation of life, as is the assumption, as an explanation of musical phenomena, that the music of the piano is the result of mechanical forces operating in the instrument itself, no skilled hand directed by an intelligent will being needed to evoke symphonies, even those of Mozart or of Beethoven. It is possible to affirm that the music is due to successive vibrations of material substances; that there

is an intimate relation between the keys, the strings, the pedals, and the sounding-board; that the form of the instrument facilitates music and consequently must be a result of "the survival of the fittest"; that the primordial piano, in its material structure, must have been an effect of "the fortuitous concourse of atoms during the cooling of some planet; that its musical power must have been evolved in intimate correlation with its material form from a quasi-musical material, "harmony stuff," which once pervaded immensity, and probably does yet; that, consequently, the music of the piano is an effect of mechanical forces operating in the instrument itself—all of which the scientific world is challenged to disprove.

The teleologist, if indisposed to accept this explanation of the origin of musical instruments in general, and of pianos in particular, may answer: Effects, evincing intelligent design, cannot be produced by purely mechanical agencies. Forces cannot prove instrumental in the production of intelligent results, except as they are directed and controlled by an intelligent will. This assertion no one is called upon to prove. If an adverse reasoner insists that material molecules can so arrange themselves as to originate life, or that physical forces can produce life, he must present such evidence as compels belief, or such at least as renders the theory credible. Until this is done, reason impels the belief that design, which is manifest in everything having life, implies the existence of a designer; intelligent results presuppose an intelligent cause. Consequently, though I may not be able to see the pianist at the key-board; though convinced that he does not sit on the stool in front of the instrument, I know he exists somewhere, even though it may be in some distant city, the determinations of his will being conveyed to the keys by electrical currents.

Even though one should be unable, after inspection, to discover any connection between the instrument and the player, he would still be forced by the principle of causality to believe that a pianist existed somewhere. If, however, he is not constrained to believe that every effect must have an adequate cause, he has as valid a right to make assertions as the materialist has. The assertion that life is the pianist is a sufficient refutation of the assertion that life is the piano, and is quite as logical. As the pianist may live after the piano has crumbled to dust, is the doctrine of immortality unreasonable? Before it can be proved that the soul perishes with the body, life and mentality being only phenomena of ever-changing material molecules, planets and even suns may go on cooling until they have become icebergs. Before the preponderance of evidence shall be in favor of such a theory, hypothetical "mind stuff,"—diffused through hypothetical ether, by the aid of which it is sought to banish God from a universe in which every living thing testifies to His existence,—will have time sufficient, if it has power adequate, to evolve an Infinite Intelligence, of which it seems to be giving promise in that it has already evolved finite intellects. Indeed, if some ambitious theorist should choose to assert that the principle of evolution—which is apparently the only thing in the universe which does not need to be evolved—has already succeeded in evolving an Omniscient Personality, could the assertion be disproved? If the atheistic evolutionist were asked to bow in adoration at the foot-stool of this Infinite Majesty, could valid reasons be given why this request should be characterized as raving fanaticism?

Every effect must have an adequate cause. An effect evincing design must have an intelligent cause. If there

is any axiomatic truth more clearly inwoven with human reason than another, it is this. It deals, however, a death-blow to materialism. When the alternative is presented of regarding life as mere mechanism, or as a substantive entity capable of directing physical forces, reason is not left in doubt which to accept. Its testimony is emphatic.

In the opinion of some, electricity is the efficient agency in the production of the succession of molecular changes which constitute life, whether those changes are restricted to the possible arrangements of indestructible atoms, or are extended to include new affections assumed by matter under each new combination. As electricity is capable of effecting new combinations of material molecules, it is assumed that it may also cause such changes as pass under the term life. Again, by others it is assumed that as under some circumstances electricity can produce heat, or light, or chemical affinity, or magnetism, or motion, it can also, under unknown conditions, produce all vital phenomena. That is, though electricity, as ordinarily known to us, is not life, it may nevertheless be transmuted into life.

We are thus brought to a consideration of the assumption, Life a mode of motion; either one of the usually accepted modes of motion—light, heat, electricity, magnetism, chemical affinity—or a mode of motion no more unlike one of these, than these are unlike one another.

In refutation of the theory that life is electricity, it is competent to affirm that in that case directly opposite qualities must co-inhere in one and the same immaterial, non-substantive, "simple succession of molecular changes." It has mind, and it has no mind. It has the phenomena of life and may be lifeless, for science asserts

that electricity may be "latent."* It must be death, for too much in the body causes death. If death may be caused by an excess of life, why is the electric eel, when dead, no longer a surcharged battery? Is it inconceivable that life should be capable of employing electricity as its agent?

Others are inclined to regard life as heat. Certainly heat, within a limited range, is indispensable to the continuance of life. Too much heat, or too little, is alike incompatible with either actual or potential vitality. If life is to be defined as heat, because the latter is an invariable attendant on the former, why may it not be regarded as water, which is also indispensable to its existence, ninety per cent of the human embryo consisting of this fluid? It is indeed true that some of the simpler forms of vegetable life can undergo desiccation to such an extent that life is seemingly extinct, and yet, on receiving moisture, revivification may take place after protracted periods of such arrested vitality. But revivification can also take place after the suspension of vital functions consequent on the loss of heat.

Without examining each theory possible under the comprehensive statement, "Life is some one of the ordinary physical forces, each of which is a mode of motion," we content ourselves with an attempted refutation of the theory as a whole. Strauss asks, "If under certain conditions, motion is transformed into heat, why may it not, under other conditions, be transformed into sensation?"

* Modern science has given us "latent heat," "invisible light," "hypothetical ether," and "theoretical mind-stuff" as well as "latent electricity"; and this, while inveighing against subtle influences. Are we not justified in expressing the hope that it may come to accept the theory of "vital force"; that in the future, when it is to achieve its greatest triumphs, it may proclaim itself the defender of the doctrine of an invisible, infinite, spiritual Personality?

Until proof is furnished that motion can be transmuted into sensation, no attempt need be made to refute the unfounded theory. Again he asserts, "A part of the sum-total of matter emerges from time to time out of the usual course of its motions into special chemico-organic combinations." Judging from the confidence with which this assertion is made, one would suppose that its author had frequently seen matter forsaking its "usual course of motions" to enter into "special chemico-organic combinations," or at least had one or more experiments upon which the affirmation rested—a few metaphysical arguments at least. No: the statement is an unsupported hypothesis. There is no proof that "matter from time to time emerges out of the usual course of its motions."

No attempt is made to defend any conception of life which interferes with the assumption that it may and does employ physical forces as its agents. There is mechanism. There are physical forces at work in every living organism. There are chemical affinities. There are electrical currents in organized beings. It is assumed, however, that in animal and rational organisms there is nothing save matter and its forces. Vital and mental forces, as something distinct from matter, are entirely ignored; and yet, without these, how shall the phenomena of life be accounted for? Is it possible to conclude that because the locomotive has driving wheels, and steel axles, and iron rails under it, and a boiler, and a supply of coal, and a sufficiency of water, and nicely fitting pistons, and handsomely constructed cars attached to it; therefore, to-morrow, at twelve o'clock, having turned itself around, reversed the seats in the cars, and kindled a fire in the furnace, it will start without an engineer from Philadelphia for Cincinnati, stopping on its way at such cities as have connections with other

rail-roads, halting for a fresh supply of coal and water where these may be had, running at a particular rate of speed to Pittsburgh and with accelerated speed beyond, emitting a shrill whistle at every road-crossing, putting on brakes when running down inclined planes, increasing the amount of steam when ascending the mountainous regions of Pennsylvania, pausing twenty minutes at meal-hours three times a day to afford passengers an opportunity of eating, making these stops where victuals are in readiness,—all this through the intelligence concealed in iron?

If any one recommends acceptance of the theory that the ordinary forces of nature, without direction from a superintending intelligence, can produce the phenomena of life, he should do more than assert that some scientists accept it; that they present arguments in its favor; that they expect to present unanswerable proof by and by, that they prophesy that in the next generation every one will believe it, that in fact nearly every intelligent person does now, except "the illiberal," "the bigoted," "the prejudiced," "the narrow-minded," and "the despicable orthodox dupes." He must furnish evidence that physical forces are equal to the production of such effects. He need not inflict upon his antagonist the prophetic science that is in the clenched fist of the future. The next generation will be able to do its own thinking; and what it cannot refute, it will no doubt respect. Neither God, nor the equity which is the child of evolution, calls upon this age to fight enemies as yet unborn. Consequently, until the unanswerable arguments are presented, reason will continue to constrain the belief that physical forces—though sufficiently potent, if directed by an intelligent will, to convey Mount Blanc to the distant

Alcyone—are in themselves powerless to produce intelligent results.

Coming now to the naked assertion, "Life is some mode of motion," the reader is invited to a consideration of the following facts.

1. Those who consider life a mode of motion, and regard the living and the not-living as substantially one, can furnish no explanation of the difference between a living organism and the same organism when dead. They cannot tell us the difference between a seed when its germ has vitality and the same seed when vitality is lost. The most they can do is to assert that the one differs from the other in degree only, not in kind. Life is a thing of degrees. The crystal, on this theory, must be regarded as having life. The stone is a "creature." Man is a thing. Certainly, it seems quite as reasonable to assert that the difference between a living germ and one incapable of development is, that one has "vital force" and the other has not—the difference being the same as that which yawns between the living and the not-living, between the crystal and the moneron. It seems like a misapprehension of the term "Life," to talk about the life of a piece of quartz. It tends to inextricable confusion. To appearances, one might as well talk about the ponderability of moonshine, or the materiality of a shadow, or the contents of a perfect vacuum, or the conscience of an ideal megalosaurus.

2. The assertion that life is a mode of motion rests on repeated reiteration. Of evidence there is none. We are not bound to accept unsupported hypotheses. If evidence existed it would no doubt have been presented.

3. Matter may be subjected to any and every known mode of motion, that is, to any and every physical force,

and still be destitute of life. There is electricity, magnetism, heat, light, and even motion (the movement of still living bioplasts) in the corpse. The not-living may be subjected to the influence of electricity, of magnetism, of light, of heat; still, it cannot be made to leap into the kingdom of life. If life is a mode of motion, either one of the ordinary modes of motion, or a mode of motion allied to the ordinary physical forces and interconvertible with them, it ought to be possible to revitalize the corpse. Let it be done, and argument ends.

4. Since, as we have been told for twenty years, motion is indestructible and convertible, science ought to be able to tell us what becomes of this particular mode of motion when the organism dies. Into what is it converted? It must be converted into some other mode, for each is indestructible, only disappearing in one form to appear in another. Into what is it transmuted? Those who are able to trace a physical force—every mode of motion—through the transmigrations it is capable of undergoing, and to present its equivalent in each of the new modes which it can assume, ought to be able to tell into what this life-mode of motion is converted. What is the equivalent, for instance, of self-consciousness? How much light, heat, electricity, magnetism, or chemical affinity does it represent? What is the mechanical equivalent, in light, of anger? What is the equivalent, in heat, of the concentration requisite to solve an intricate mathematical problem? What is the equivalent, in electricity, of intense affection for an absent daughter? Would it be equal to the transmission of a telegram under Atlantic's billows? What is the equivalent, in magnetism, of the resolute determination to be rich, honestly if possible, but rich? Would it be adequate to the production of such attractions and repulsions as to

render a "mode of motion" the plaything of two contending principles, right and wrong?

If, however, as Dr. Bence Jones asserts, "Death is the stoppage of the conversion of latent force into active force," then, Does the magnet die? Does the corpse never decompose?

5. All the motions of the not-living universe have failed in producing a trilobite from inorganic matter. Spontaneous generation has become bankrupt, not for lack of admirers, but because it has never produced even one moneron. Life is from pre-existing life, not from some mode of motion. Nor has any chemist succeeded in originating life in the laboratory, which apparently he ought to have done, if life is a mode of motion.

THE BIOPLAST.

Prof. Huxley, who congratulates himself on having at last discovered "*the physical basis of life*,"—though "bathybius," which he once regarded as the parent of all living organisms, has turned out to be nothing but sulphate of lime,—resolutely persists in viewing life as a mere machine, of which the protoplast is the engineer. He asserts:—

"A mass of living protoplasm is simply a molecular machine of great complexity, the total results of the working of which, or its vital phenomena, depend, on the one hand, upon its construction, and, on the other, upon the energy supplied to it; and to speak of vitality as anything but the name of a series of operations is as if one should talk of the 'horology' of a clock."—*Encyc. Brit.*, art. "Biology," p. 589.

"A machine of great complexity" life manifestly is, since it is capable of turning out strange products, of effecting singular metamorphoses. One kind of machine, which we denominate human, converts beef into metaphysics, bread into logic, turkey into imagination,

oatmeal into obstinacy, sauerkraut into love, potatoes into hope, mackerel into piety, dove into hatred, and plum-pudding into cheerfulness.

Of this machine, "its vital phenomena depend, on the one hand, upon its construction, and on the other, upon the energy supplied to it." Its construction, be it remembered, is the combined result of "the fortuitous concourse of atoms during the cooling of a planet," and the working of purely physical forces. These causes, acting either singly or in conjunction, might have produced a "machine" whose vital phenomena would have been different. In that case, the human machine might have believed that a cause is not equal to the effect it produces; that material causes can produce spiritual effects; that there is no basic distinction between the living and the not-living; that an intelligent effect does not imply the existence of an intelligent cause; that it is as unreasonable to regard thought as anything else than the activity of invisible and fortuitously aggregated molecules, as it is to conceive of the ponderability of platinum as a substantive entity; that the freedom of the will is an inconceivable, though pleasing, delusion.

"The energy supplied" to this "machine of great complexity" must come from without, for otherwise the author would have contented himself with affirming, "Its vital phenomena depend upon its construction." If the energy supplied was from without, then this molecular machine must have indicated at stated intervals its need of new energy, the kind it coveted, and the amount demanded, attracting it as exigency required: or, physical forces, external to the machine, must have been able to see when energy was needed and what kind was necessary; and, having made choice between rival candidates, must have been equal to the task of enforcing

obedience to the conclusions reached. Intelligence must have been resident somewhere, either in the machine itself, or in the forces which furnished energy. To reason respecting the intelligence and the will of "a mass of living protoplasm" seems like reasoning in reference to the conscience of an insect; and to talk about the intelligent purpose manifested by modes of motion appears like talking about the "horology" of a clock, or rather, about the "horology" of clock-force.

Moreover, the employment of the term vitality, as though it were synonymous with life, tends to produce confused ideas. Does the author mean to intimate that the vitality of each protoplast, in this "molecular machine of great complexity," is the same as the life of the organism which it aids in constructing? Is the life of each organized being nothing more than the aggregated life of the millions of protoplasts which weave the body? If so, where is the agency which directs the movements of these protoplasts, or bioplasts? * How does it happen that the different parts of organic structures are so nicely adjusted, and so correlated each to the other? Every organ is adapted to the parts adjacent, to the symmetry of the entire body, and to the functions it is designed to perform. A mere "mass of protoplasm" is not a personality. To render a bioplasmic mass a personality there evidently must be some superintending agent. What is this agent? Beale denominates it life. Those who call it molecular machinery seem to us as if they were talking about the length, breadth, thickness, and color of love; or the inertia, figure, and porosity of an abstract conception; or the size, mobility, attraction, and compressibility of a mathematical point.

* Bioplast and protoplast are regarded as equivalent in meaning, though bioplast is considered the preferable term, having been more accurately defined.

In entering upon a refutation of this form of the mechanical theory a few concessions may be made:—

1. It is conceded that the bioplast,—a transparent, gelatinous substance, apparently structureless, seemingly the same in every plant and every animal, originating in a pre-existing bioplast, dispersed through all tissues, constituting a large part of every living organism, throbbing continuously, thrusting out one portion of itself beyond another, etc.—is capable of absorbing nutrient matter, which by some inexplicable process is instantaneously converted into living matter, forming a cell-wall and developing a nucleus, and within this a nucleolus; that of the nutrient matter, transmuted first into living matter and then into formed matter, it constructs nerves, arteries, veins, tendons, brain, bone, etc.; that it is capable of reproduction by self-division, the division being sometimes through the nucleus, and sometimes not; that without a cell-wall and even without a nucleus, it can live, move, and transform pabulum into living matter; that it is a morphological unit, that is, it is an ideal unit of the parts of the structure of plants and animals, not an elementary unit of the “vital force” in these organisms.

“For the whole living world then it results: that the morphological unit—the primary and fundamental form of life—is merely an individual mass of protoplasm, in which no further structure is discernible; that independent living forms may present but little advance on this structure; and that all the higher forms of life are aggregates of such morphological units or cells, variously modified.”—Prof. Huxley, *Encyc. Brit.*, “Biology,” p. 590.

Divest this statement of the assumption that organisms higher than the bioplast are nothing more than aggregates of bioplasts, no “vital force” external to them being necessary to direct their working, and no objections to accepting the statement suggest themselves.

2. All is conceded that Dr. Lionel S. Beale (whose

knowledge of the bioplast exceeds that of Prof. Huxley, of Prof. Bain, of Prof. Tyndall—indeed, of the entire host of materialists) says, in *Protoplasm; or Matter and Life*, a volume well worthy of careful study. He affirms:—

“Nothing that lives is alive in every part” (p. 181). “It was shown that upon it [living matter] all growth, multiplication, conversion, formation, and, in short, life, depended” (p. 184).

“The ultimate particles of matter pass from the lifeless into the living state, and from the latter into the dead state suddenly” (p. 185).

“Of the matter which constitutes the bodies of man and animals in the fully formed condition, probably more than four-fifths is in the formed and non-living state” (p. 187).

“No language could convey a correct idea of the changes which may be seen to take place in the form of one of these minute particles of bioplasm, when alive” (p. 207).

“Though nuclei and nucleoli are living matter, they do not undergo conversion into formed matter except as regards the very thin envelope” (p. 212).

“The living matter, with the formed matter upon its surface, . . . is the anatomical unit, the elementary part, or cell” (p. 217).

“Each mass of bioplasm increases in size by the absorption of nutrient matter” (p. 221).

“What is essential to the cell is matter that is in a living state—bioplasm, and matter that has been in a living state—formed material. With these is associated a certain proportion of matter in solution, and therefore not visible, but which is about to become living—the pabulum or food” (p. 225).

“The new centers (nuclei) may divide and subdivide, as well as originate anew in already existing bioplasm; but bioplasm destitute of nuclei and nucleoli may divide; so that these bodies are not essential to the process” (p. 233).

“If we could only make fluid flow through the cell, after its death, uninteruptedly in the same direction and with the same force as it is made to flow during life by the action of the living matter, ciliary movement, I think, would continue although the living matter of the cell was actually dead” (p. 238).

“At every period of life in every part of the body, separated from one another by a distance little more than one one-thousandth of an inch, are little masses of living matter which are continually absorbing nutrient materials, and undergoing conversion into structures” (p. 304).

Dr. Beale, who is competent authority in reference to the marvelous power of the bioplast, is a determined opponent of materialism and of the mechanical theory of life.

3. There is mechanism in every living organism, from the trilobite to the elephant, from the lichen on the ice-fields of the Arctic zone, or the algae in springs whose temperature is 200° F., to the philosopher in the process of constructing a new theory of light, or to the theologian bowing at the footstool of The Unfathomable.

It is denied that the following statements have been established by satisfactory proof:—

1. Matter may possess spiritual properties.
2. Life is mere mechanism: “living things are machines in motion.”

No one has proved that the several tissues of living organisms become, or can become, mutually adapted to each other by the operation of purely physical forces. The ultimate arrangement in adult animals must have been foreseen. Preparation for the attainment of a definite purpose must have been made before tissue of any kind was produced. The materialistic hypothesis fails in explaining how each part became adjusted to every other. Though some of the phenomena of life can be explained by mechanism and some by chemistry, the ultimate results require the hypothesis of “vital force,” distinct from and superior to mere physical forces. More is included in the term life than is contained in the aggregate of elemental units. The formation and growth of tissue—the building up and breaking down, addition of matter thereto and removal of matter therefrom—cannot be fully explained by mechanics and chemistry. The movements in and by organized beings are unlike anything that is known to occur in inorganica. Growth by the assimilation of food taken within is diverse from growth by accretion. Attraction does not, and cannot, account for the passage of pabulum towards and into living matter; and no known physical force is competent to trans-

mute it into living tissue, the elements being not only re-arranged, but so far altered that compounds which may be detected in the nutriment are not present in its product. The physical and chemical changes of which we have knowledge are dissimilar to the changes which are designated by the term life. In not one instance have the phenomena of a living organism been explained by physical forces. Those who believe in "molecular modifications" have not explained what they mean by the expression; nor have they shown what agencies produce these "molecular changes." It has not been proved that life is in dependence upon mechanics; nor has it been proved that no forces are operative in the formation of bodily structures except material, nor even that these act exclusively through the bioplast. The elemental units of man's body are arranged, directed, and controlled, as material forces nowhere else direct and control matter. The material of the human organism comes and goes: the power remains substantially unchanged. Vital force suspends the action of chemical affinity; it defies the force of gravitation, carrying sap to the top of the tallest cedar. It controls electrical currents. Are such results possible to mere aggregations of infinitesimal bioplasts, no one of which has any discoverable organism, or any machinery whatsoever?

3. It is denied that, "If an entirely organless mass of matter may have life, either actual or potential, then life must be molecular arrangement effected by ordinary forces." If the bioplast is structureless—which has not been proved and is apparently inconceivable—it is seemingly necessary to assume the existence of a vital force, if the phenomena are to be explained. If it is to be conceded that the organless condition of the bioplast is proved, then, as is apparent, the difficulties are aug-

mented, instead of being diminished. Can an organless mass build up a complicated organism? In degrading the bioplast to such an extent as to characterize it as a structureless mass, its friends have tempted us to pronounce it unequal to the tasks imposed upon it. Admitting, however, that a "totally organless mass may have life," does it follow that life is "molecular arrangement effected by ordinary forces"? May it not be an independent "force"? Moreover, it seems like labor lost to take pains in attempting to prove that infinitesimal masses of bioplasm are the elementary units of life, and then, after striving to induce the acceptance of this as an ultimate fact, proceed to assert that life is a particular arrangement of atoms effected by "ordinary forces." Has it been proved that these are capable of so arranging molecules as to impart bioplasmic life? The difference between a dead and a living organism, is it merely the way in which the particles stand related *inter se*? Is life originated by placing material atoms together in a specific way? Again: it may be asked, Is it susceptible of proof that at the death of an organism some extraordinary force has prevented these "ordinary forces" from acting any longer as they have acted since the birth of the organized being? If these ordinary forces act in a certain way for a protracted period, what prevents them from continuing to act in the same way? Seemingly, if life is not independent, there must be some force whose nature is as yet unknown beyond the simple fact that it controls "ordinary forces" to the extent of preventing them from continuing the existence of the living organism. So then, if life is not an extraordinary force, death, apparently, must be so regarded. Death is defined as loss of correspondence with environment; but what causes the loss of correspondence?

4. It is denied that bioplasts can perform this marvelous work without a directing agency. If bioplasts build up all living organisms, there must be in every organism a power which directs their working; or, over and above the kingdom of life, there must be an intelligence which employs bioplasts as instrumental agents in constructing organisms. If there is a directing agency in every organized being, are there any objections to denominating it life? If there is no such directing agency, God must be "working all in all." An organization without an organizer is an impossible conception. Life is an independent entity, owing its existence to the same cause which originated matter; or God, without the intervention of a secondary agent, is the Life of the universe. The latter, or pantheistic conception, finds its refutation elsewhere, leaving reason free to assert: If bioplasts build up living organisms, something must direct their working.

A few concessions have been made by materialists, as follows:—

1. "The phenomena which living things present have no parallel in the material world."—Prof. T. H. Huxley, *Encyc. Brit.*, "Biology."

2. "The increase of size which constitutes growth is the result of a process of molecular inter-susception, and therefore differs altogether from the process of growth by accretion."—*Idem*.

3. Any and every mechanical theory of life finds a very serious obstacle in the genesis and continuance of self-consciousness. This is conceded by Huxley, Tyndall, Spencer, Haeckel, Bain, indeed by nearly all the advocates of the molecular hypothesis, some even acknowledging that it is an obstacle that has not been surmounted, and is seemingly insurmountable. Undisputed.

4. The bioplasts which produce nerve cannot be constrained, either by forces resident in the body or by external influences, to produce muscle. Each set performs the work for which it was designed, and no other. Though they are apparently the same, in plant and in animal, in muscle and in brain, the results of their labors are entirely different. This is conceded by all.

5. Bioplasts, though very near each other, never interfere with each other's growth, and never coalesce. Conceded.

6. The several sets of bioplasts, each independent of the other, produce, as a joint result of their labors, a complicated net-work of muscles, tendons, nerves, etc. This result, not alone in its individual parts, but in its totality, evinces design. Undisputed.

7. "All that is at present known tends to the conclusion that no cell has arisen otherwise than by becoming separated from the protoplasm of a pre-existing cell; whence the aphorism, *omnis cellula e cellula.*"—Prof. Huxley, *Encyc. Brit.*, "Biology."

8. Substances which are appropriated by one form of bioplasts will act as poison on another. This is asserted by Dr. Beale and is unchallenged by his opponents.

9. "The chasm between the living and the not-living the present state of knowledge cannot bridge."—Prof. Huxley, *Encyc. Brit.*, "Biology."

Is it not possible from these concessions alone to construct an argument sufficiently powerful to overthrow the mechanical theory? If "the phenomena which living things present have no parallel in the mineral world," is it legitimate to assert that life is molecular arrangement? The assertion, unsupported by proof, is a pure assumption. To assert that because matter under different forms may have different properties, therefore, when its

molecules are arranged in a particular way by "ordinary forces," life is one of its properties, seems like a *petitio principii*. That inertia is one of the properties of aggregated matter, science has proved, as is generally believed. That mobility is a property of air can be established. That expansibility is a property of gas is susceptible of proof. Has it been proved that life is a property of matter, provided its atoms are arranged in certain ways? It has been assumed to be, merely because matter assumes new properties when new combinations are effected.

Moreover, if we are to accept this theory we are under the necessity of regarding bioplasm, Dr. Lionel S. Beale assures us, as "hard and soft, solid and liquid, colored and colorless, opaque and transparent, granular and destitute of granules, structureless and having structure, moving and incapable of movement, active and passive, contractile and non-contractile, growing and incapable of growth, changing and incapable of change, animate and inanimate, alive and dead."

This theory, under whichever aspect we view it, the purely materialistic or the semi-teleological, fails in explaining the sense of personal identity. If man is simply a mechanism—molecules of matter braided together in certain ways, which molecules are incessantly changing, new ones taking the place of those removed from the system—how does it happen that he retains the sense of personal identity down to old age? He believes himself the same person who at the age of five years received the dying counsel of an endeared father. The body, however, has passed through several entire changes: modern science says it has been renewed every year. How could these evanishing atoms, whatever their molecular arrangement may have been, communicate to

their successors the facts entrusted to memory? Can they convey down to old age, the loves and the hatreds, the moral principles and the settled judgments, the fears and the hopes, of an antecedent life? Strange! If, as some assert, these treasures are the possession of an underlying reality, which has two sets of properties, the material and the spiritual, then what is the agency by which this "single undivided reality" becomes possessed in man of properties so diverse from those it possesses as it underlies platinum? Has platinum sensation and consciousness and memory? Does the mentality of the crystal differ only in degree from that in man? Reason is disposed to answer: Upon the theory in question no explanation of the phenomena of conscious existence is possible.

If, as is confidently affirmed, bioplasts are precisely the same in every living organism, then—since some weave tendon; some, muscle; some, nerve; some, brain; some, mule; some, cabbage; some, oyster; some, rose—there must be some power back of them which causes them to produce such diverse results. If these materialistic philosophers are mistaken in affirming that all bioplasts are alike, then what makes them to differ? Has each species of bioplast a molecular arrangement peculiar to itself? Science, it would seem, has not yet struck its hammer upon the foundation stone of life. If bioplasts do not differ, why do the results of their working differ so widely? Causes precisely alike ought to produce effects precisely alike. If they differ, and the difference is due to different "molecular arrangements effected by ordinary forces," what is the agency which causes these "ordinary forces" to present such diverse products? Who taught these various kinds of bioplasts to work harmoniously in the production of the greatest miracle ever performed in

the universe, the construction of a human body? Who gave them instruction in so correlating its parts that they might be all subject to the will? Who educated them in the art of transmuting nutrient matter into living matter? If the transformation is a mere change in the arrangement of the molecules, effected by physical forces, why may not physical forces effect, in the animal kingdom, the requisite molecular arrangements with inorganic matter, constructing animals directly from mineral substances, and not as is invariably the case from pre-existing bioplasm? After explaining why animal bioplasts are thus restricted in their operations, while vegetable bioplasts, which are declared to be the same, are capable of working inorganic matter into living organisms, the materialist may proceed to explain whence the animal bioplast acquired the skill of weaving a nerve through and around a muscle, a tendon through an opening left in a bone for its reception. What agency directs the working of these infinitesimal units of life? Materialism answers: It is all mechanism, pure mechanism, without any superintending agency which directs the myriad movements of the complicated machine. Reason asserts: No.

It is irrational to assume that several sets of bioplasts, acting independent of each other and without any superintendent, may produce a joint result which evinces design. How do they happen to construct a socket and a ball to constitute a joint? How are they induced to construct an eye fitted to receive light, and a nerve adapted to communicate the sensation of light to the brain? How came they to fashion an ear adapted to the reception of sound? Is it possible that the labors of ten thousand slaves, who worked upon the great Pyramid of Gizeh, were not directed by any superintendent? If there had been as many independent wills as there were

workmen, or rather if there had been no wills whatever, would there have been unity of design in the result? The illustration, however, does injustice to the teleological theory of life, for the bioplasts that work in the human body are numbered by millions, not merely by thousands; nor are they capable of holding consultations and determining upon a plan which shall have its parts so related as to manifest a settled purpose looking to remote results, as Egyptian pyramid-builders might have done; nor is the life of bioplasts extended to nearly half a century, thereby enabling them to realize the completion of their plans, as is true in the case of the human beings whose bodies they build. What, then, is the power which moves, directs, and controls bioplasts? Materialists answer, Physical force. Reason answers, Life. Beale, and Carpenter, and Frey, and a host of other specialists answer, Yes, life.

Dr. Lionel S. Beale says:—"In the first place, no one has been able to explain, by known laws, the facts of development; and secondly, no one is able to premise from the most careful and minute examination of living matter that can be instituted, what form will result from its development, or what kind of organism has given origin to it; and lastly, the occurrence of successive series of structural changes which occur at definite periods of development of a living being as its structures and organs gradually progress towards completeness, and which are as it were foreseen and prepared for at a very early period, long before any structure whatever has been evolved, cannot be accounted for unless some guiding power unknown to physics, and not yet brought within the grasp of law, is assumed to exist."

Again: "I have ventured to speculate concerning vital power simply because I find it impossible to account

for the ordinary universal life-phenomena without the aid of an hypothesis of this kind. I ask by what means the matter of a living being is made to assume certain definite relations in order that a fixed purpose may be carried out at a distant period in time? It is asserted confidently that all is due to physics, that life is inorganic force; and it has even been affirmed that life is associated with every kind of matter, non-living as well as living, that physical force is life, and that life is physical force. But this is pure assertion, for no form or mode of force under any conditions has been known to effect changes in any way analogous with those by which every form of matter that lives is characterized."

Once again: "If I may be allowed to state, what according to my idea would be the inference deduced by an unprejudiced scientific observer who had studied the minute changes in living matter and the gradual development of lifeless form out of the living formless, it would be this: That the true cause of what he observed could not be physical, and that the remarkable phenomena he noticed were not due to ordinary material forces." *

* *Protoplasm; or Matter and Life*, Dr. Lionel S. Beale, 1874, pp. 310, 357, 359.

CHAPTER XVIII.

LIFE AND ITS RELATIONS TO MATTER (*CONTINUED*).

IT may perhaps be said that a complete refutation of the mechanical theory necessitates a consideration of the views of those who do not regard life as an attribute of matter, but as an attribute of an underlying reality which has two sets of properties, the material and the spiritual. Has the existence of any such underlying single reality been proved? If so, what is it? If not, why push the question into the field of pure speculation? Besides, if there is any such undivided reality underlying all things, whether it be material or immaterial—and it must be one or the other—it must be a very singular reality which is capable of possessing two directly opposite sets of qualities, extension and non-extension, activity and inactivity, form and formlessness—the distinctive properties of mind and the distinctive properties of matter also.

This theory, in the hands of Prof. Alexander Bain and Prof. Tyndall, assumes the form of an elaborate attempt to combine two theories of life,—the mechanical and the teleological. "The arguments," says Prof. Bain, "for two substances, have, we believe, now entirely lost their validity; they are no longer compatible with ascertained science and clear thinking. The one substance, with two sets of properties, two sides, the physical and the mental—a double-faced unity—would

appear to comply with all the exigencies of the case." *

The advocates of this view claim for it the honor of doing full justice to both phases of life, the material and the mental. They pronounce it competent to explain all the phenomena of organic existences, regarding them as an intimately connected, and uninterrupted series of purposive effects resulting from the varied combinations of the two sets of qualities which inhere in the one substance. Life, then, is not to be regarded as a necessary, nor even as an ordinary, quality of matter, indeed not as a quality of matter at all, but as the quality of a substratum in which inhere both the matter and the life of an organism. Life is an affection which matter seems to assume when its molecules are arranged according to a certain extended class of forms, that is, in the vegetable and animal kingdom; in reality, the spiritual side of this "double-faced unity" is more fully turned towards the observer—simply this. Matter, whatever its primary qualities may be, takes upon itself new qualities with new arrangements of its molecules. Life, whatever its essential attributes may be, manifests different phenomena according to the combinations of spiritual qualities displayed by this underlying reality in each living organism. Life, so far as science is able to determine, is never separate from matter. Matter, under every form, has some measure of life. The one substance has two sets of properties; here, the physical are more conspicuous; there, the mental are. Mental qualities, transmissible in a material germ, are so far independent of external influences, and so far permanent in each organism, as to need no internal directing agent to control them, only a certain environment being necessary to their full

* *Mind and Body*, p. 196.

development. Physical forces, during the life of each organic being, maintain that arrangement of the material molecules which enables the underlying substance to manifest its non-material qualities. The bioplast is the morphological unit, every living organism being merely an aggregate of bioplasts. The infinitesimal units of life, being capable of reproduction, build up animal structures by converting nutritive matter into living matter.

It is safe to say that this is also a mechanical view of life. Huxley admits that "It may be combined with a strictly mechanical view of evolution." It is difficult to see how we can regard it as anything else, unless under its guidance we pass into some pantheistic theory of the universe. We do not account for the evidences of design everywhere apparent in nature, especially in the kingdom of life, by assuming that there is an underlying substance, which, when matter assumes the molecular arrangement peculiar to bioplasm, is capable of manifesting spiritual attributes, the spiritual gleaming, as it were, through the interstices of the material. Most of those who are familiar with the teachings of modern physics are prepared to admit, with Prof. J. Clerk Maxwell, that matter may assume new affections when new combinations are effected;* that the magnitude and motions of the molecules which combine, and the physical forces which are operative in effecting the combination, determine in measure the properties which they shall manifest under their new forms; but, though the present tendency is manifestly towards the acceptance of the theory that matter is merely phenomenal, it has not been proved that matter and spirit are but two phases of one undivided substance,

* "In modern times the study of nature has brought to light many properties of bodies which appear to depend on the magnitude and motions of their ultimate constituents."—J. Clerk Maxwell, *Encyc. Brit.*, art. "Atom," p. 33.

in which inhere inertia and sensation, changefulness and the sense of personal identity, powerlessness and will-force, insensibility and self-consciousness.

If, as every form of the mechanical theory assumes, molecules of matter braided together in certain forms have inherent power adequate to the construction of every living organism, that is, if the structureless infinitesimal bioplast is the artificer of all living forms; then, everything is explained in the kingdom of life, save this marvelous "morphological unit." How came this possessed of such wonderful powers? If it is structureless, then life is antecedent to organization, and may be its cause. A living atom without organs produces marvelous results. These results cannot be attributed to the atom, for that would be to assign effects to an inadequate cause. Nor are the effects produced by the organs of the bioplast, for organs it has none.

Dr. Joseph Cook has defined life as "the power which directs the movements of bioplasts." Against this definition objections may be raised. It has not been proved that life is a power which is restricted to the production of movements in bioplasts. Is it impossible that life should produce any other modes of motion except those peculiar to bioplasts? Do all movements of the body originate in movements of bioplasmic masses? Besides, the bioplast, we suppose, possesses life, and is not a mere machine driven by life. It may be regarded as possessing vitality independent of its movements. Consequently, life, as represented in this first link in the chain of the living is not defined by saying, "Life is the power which directs the movements of bioplasts."

If the bioplast is structureless, though possessing power adequate to construct all organisms; and if it has no individual life, though capable of imparting life to

nutrient matter; then why regard it as the true morphological unit? The unit ought, it would seem, to possess a structure of its own, and a life of its own. Not possessing these, the task is imposed upon it of producing effects not contained in itself as cause. If, on the other hand, the bioplast has an individual life of its own, whence did this life originate? To say that molecules of matter chanced to come together in such forms as to originate life, does not satisfy reason. God is not eliminated. If He is needed nowhere else, He is indeed as the Creator of bioplasm.

If it is said that the bioplast has an organization, though it cannot be discovered under the most powerful microscope, then how came it to possess this organization? How did it happen to be an organization endowed with skill adequate to the marvels attributed to it? A cause must be equal to the effect produced by it. Consequently, small as it is, it must be equal to the production of every species of plants and animals, if, as we are told, they are all constructed by it. Accordingly, it must be the most powerful agent in the universe. But it is unquestionably an effect. Can that which is capable of constructing organisms originate without an organizer? As the effects which it produces evince design, can it possibly have come into being without a designer? Purpose implies will. The more wonderful the results the bioplast is capable of producing, and the more completely its working is independent of superintendence, the greater the need of assuming that it must be the production of an Intelligent Designer.

Life has been defined as intangible, incorporeal, highly attenuated matter; not as ordinary matter with its commonly accepted properties, but as matter attenuated to the last degree, inponderable, incapable of

being subjected to investigation of any kind whatsoever, having still greater tenuity than odor from zinc, than diffused particles of musk, than scent from the track of the fox; more attenuated than the hypothetical ether which is supposed to pervade interstellar space; rivaling in tenuity light, heat, sound, electricity, magnetism, which are regarded as corpuscular emanations from the grosser forms of matter, not as undulations; existing in a state of rarefaction scarcely conceivable except upon the hypothesis that matter is infinitely divisible.

This attenuated material substance is regarded as possessing the properties commonly considered as belonging to spirit. The advocates of this theory deem it unnecessary, and indeed irrational, to make any essential distinction in the fundamental nature of material and spiritual substances—all are material, though the distance between the two extremes is almost infinite. Consequently, no practical harm can come, they think, in continuing to employ the two terms, matter and spirit, the ponderable and the imponderable, "*soma*" and "*pneuma*," it being understood that the former is a visible, tangible, ponderable body, and that the latter is an invisible, imponderable, intangible, incorporeal substance.

This theory, though occasionally employed in defence of theistic conceptions of the universe, is nevertheless only a modified form of materialism, and shares its fate.

MR. SPENCER'S DEFINITION OF LIFE.

The famous definition of life given by Mr. Herbert Spencer merits attention, and may as well be considered at this point. He defines life as "The definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external co-existences and sequences."

This has one recommendation at least,—it is a labored attempt to employ terms sufficiently broad to embrace all life from a lichen to an archangel. Whilst, however, it manifestly includes “the life of the crystal” formed by the chemist in the laboratory, it is doubtful whether it can be regarded as embracing germ-life when in a state of suspended development. In the kernel of wheat which retains life in suspense after lying in an Egyptian sarcophagus three thousand years or more, has there been a definite combination of heterogeneous changes both simultaneous and successive? Is there any special propriety in a definition which excludes life in this form, while including it in a form less analogous to the life of human beings?

“A combination of heterogeneous changes”! Why exclude from the conception the cause or causes which produce these changes? It would, to appearance at least, be more consonant with reason to define life as the efficient cause in the production of a series of changes. What agency produces this “combination of changes,” and how are they related to each other? Is each a necessary effect of a pre-existing change in the organism itself? Again: is the term life to be conceived of as including all heterogeneous changes? If so, how shall the changes in the mineral kingdom be distinguished from those in the animal? Inorganic matter undergoes changes from the simple to the complex, from the homogeneous to the heterogeneous. Are these included in the combination which defines life? Mr. Spencer intended them to be. If not all “heterogeneous changes” are included in this “definite combination,” which are? Until this is determined, no definition is furnished of the life characteristic of the organic world, the thing to be defined. Unless this is distinguished from everything else, no tangible result is reached.

To the term "combination" the author has prefixed the word "definite" with the view, apparently, of limiting its application. Does this restrict the combination to changes occurring in the animal and vegetable kingdoms? No: for there are definite combinations of changes in the inorganic world. He adds, however, "both simultaneous and successive," with the view of further limiting the terms employed. As such changes occur, however, in the domain of matter, as well as in the kingdom of life, no assistance is rendered in acquiring clear conceptions of what organic life is. He adds another limitation; this "definite combination of heterogeneous changes, both simultaneous and successive," must be "in correspondence with external co-existences and sequences." The substratum, then, in which these changes inhere must be subject to influences from environment. The simultaneous and successive changes which take place in the crystal, under the hammer of the geologist, are in correspondence with co-existences—the hammer and the human arm,—and in correspondence with sequences—the fragments. Is the pulverization of the crystal to be regarded as life? There was a substratum in which the changes inhered. There was a combination of "heterogeneous changes, both simultaneous and successive." This combination was "definite." It was also "in correspondence with external co-existences and sequences."

Is the labored definition a philosophical explanation, from the stand-point of evolution, of the inexplicable process by which a definite combination of infinitesimal molecules of "star dust" become condensed into the planet Jupiter, in correspondence with co-existing nebulous masses of "mind-stuff," and in complicated correlations with worlds and suns floating purposelessly in the

undisturbed ocean of immensity, and in admirable congruity with infinite sequences, both proximate and remote, not alone in the planet formed, but as well also in everything that has, can, shall, or may come under the limitless sway of its incomprehensible potentialities? Does it render it possible to assert that the life of this measureless universe, as it gleams on the outer fringes of immensity, is the same in kind as that which pulsates in a Sir Isaac Newton, differing only in degree. May we not affirm that the hitherto insolvable problem, "How to define life," has been solved? When the philosophy of agnosticism has found a grave behind the western hills, being laid to rest in the mausoleum where innumerable systems of philosophy have found a sepulcher, one fact which it *knew*, the content of the term life, will be left as a legacy to befogged humanity.

Some adherents of the materialistic school fail to appreciate Mr. Spencer's elaborate definition. They assert that he should have limited the changes of which he speaks, to those which occur in the life of a bioplast. Consequently, they charge him with deficiency of knowledge in reference to the powers of bioplasmic elements; and hence repudiate the definition.

II. Definitions which regard life as a substantive entity; a substance, but not matter; an entity, but not a material entity; a substantial and independent existence, possessing organizing power and the capacity of reproduction; susceptible of being influenced by matter and by physical forces, and of influencing them; having power in animals adequate to the assimilation of organic materials, and in plants adequate to the incorporation of inorganic matter; having the power of adapting itself to environment within certain limits, and of varying the individual organism to a limited extent.

Life has been defined as "a directing agent," "an organizing principle," "the cause of form in organisms," "a vital force."

These attempts to define the term, and as well all others made by teleologists, proceed upon the apparently rational assumption that an organizer must exist before organization can begin; that the entity which exists antecedent to organization may continue to exist after the material organism which it constructed has been resolved into its original elements. This teleological theory denies that man is mere matter, there being no spiritual superintendent. It affirms that the ordinary forces of nature could not have produced a body with such intricate, ingenious, and delicately woven tissues. It concedes that the sculptor can chisel the marble till his genius glows on every atom of its surface: it denies that he can impart life to the statue. It acknowledges that the painter can blend his colors till they express hope, love, fear, or hatred: it affirms that he cannot give life to the canvass. It admits that the skilled workman can weave his threads into a delicate texture; that taking them apart one by one, he can weave them into a new texture with different designs: it denies that he can give that texture the power of self-movement, the capacity of reproduction, the power of transmuting flax into wool, and of incorporating the transformed material into its own structure. It asks, If life is simply matter and physical forces, then, why may not the enfeebled body be rejuvenated, and the corpse be revitalized? Chemists, it would seem, ought to be able, in that case, to restore the dead to life; indeed, science, ere this, should have taught us how to exempt a material organism from the ravages of approaching dissolution. The magnet can be magnetized; after losing the magnetic influence it can be re-magnetized. But life once gone, no

physicist can recall it. If life is a result of physical forces, we ought to have learned how to keep the machinery running uninterruptedly. What leaves the body when death claims it as her own? From the germ that has been capable of development, but has become incapable, what has departed? The teleologist asserts, Vital force is gone. When what we denominate life has departed from an organism, leaving it nearly unimpaired, as when one dies from fright, why are physical forces and matter, if they alone constructed it in the first place, incapable of repairing it, thereby setting the machinery to running again? We answer, The vital force is gone. Can materialists give a more satisfactory answer? If a few atoms of flax, after weaving themselves into a fabric, were capable of taking wool, cotton, paper, and straw, and, after transmuting them, incorporate them into their own structure, thereby enlarging and strengthening that structure as well as providing against the incessant wear and waste to which it was subjected, there would seem to be no assignable reason why the process should not be continued indefinitely.

While it is safe to say that the term life—like the terms time, space, matter, spirit—has not been defined, the definitions given by teleologists being too indefinite to satisfy reason, it is nevertheless reasonable to assert that there is such an entity as "vital force," distinct alike from matter and from the ordinary forces of nature. Deeming this susceptible of proof, we present a series of arguments succinctly stated.

1. Life has not been produced in the laboratory of the scientist. Chemistry and mechanics are as yet childless. They have not presented the world with a drop of albumen capable of taking food, assimilating it, moving, growing, and reproducing itself.

This ought to have been done, if life is mere mechanism.

2. There is no evidence that spontaneous generation—what Huxley denominates abiogenesis—is now occurring, or ever has occurred, anywhere in the universe. Mr. Huxley says in the *Encyclopedia Britannica*, in his treatise on "Biology": "At the present moment there is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which the existence of life on the globe is recorded." If life is not a something distinct from matter and from ordinary forces, spontaneous generation ought to be occurring continuously.

3. No known force has been converted into vitality; nor has vitality been converted into any one or more of the physical forces. Consequently, vitality must be something distinct from ordinary forces.

4. Nutritive matter passes instantaneously from the non-living to the living state, and under conditions where the change is inexplicable by the ordinary inorganic forces. So likewise death is instantaneous.

5. So far as is known to science, no force, save that denominated "vital," is competent to account for the passage of nutrient matter towards and into the center of living matter. Dr. Lionel S. Beale says that chemical affinity cannot explain it.

6. No inorganic force furnishes a satisfactory explanation of the fact that the moment nutrient matter becomes living, it moves from the center of the cell outwards. Why is the flow of the non-living centripetal, and the flow of the living centrifugal? Why is the movement of the one invariably in an opposite direction to that of the other? Dr. Beale affirms that no form of attraction and repulsion accounts for the phenomena. To reduce

life to "mere attractions and repulsions," and to "regard physiology as a complex branch of physics," Huxley severely denounced it in 1853. He prefers to view "vitality as a property inherent in certain kinds of matter." He thinks the life-property of protoplasm is due to its elements,—oxygen, hydrogen, nitrogen, carbon, and phosphorus. He says:—"If the nature and properties of water may be properly said to result from the nature and disposition of its molecules, *I can find no intelligible ground for refusing to say that the properties of protoplasm result from the nature and disposition of its molecules.*" He has not proved, however, that the properties of different substances are properties in the same sense, nor that they are properties of the same order. What is the particular property of protoplasm which causes nutrient matter to move inwards towards its center, and living matter to move outwards towards its circumference? We have the authority, not only of Beale, but even of Huxley, for affirming that the phenomena are not produced by attraction and repulsion. Are they an effect of vital force?

7. The changes effected in substances by living matter are essentially different from those produced by other agencies. Nutrient matter is changed when it is transmuted into living matter.

8. Neither the formation, nor the growth, of the simplest living thing can be explained without the assumption of some force independent of, and superior to, chemical and mechanical forces. If, according to the theory now popular, the living and the not-living alike consist of ordinary matter and ordinary force, being the same in kind and differing only in degree; and if, as we are told, there is in living things no vital principle separable from the matter with which it is associated, and

from which, as well as from ordinary force, it is essentially different,—then why are scientists unable, with the assistance of matter and mere physical force, to explain the formation and growth of any living organism? Why is every explanation that is given incessantly assuming the existence of a force diverse from any force known to exist in the inorganic world?

9. There is a wide difference between inanimate molecules and animate molecules; and yet both are subject to the ordinary forces of nature. The lifeless and the living are governed by laws essentially different. There must be a vital force, whose laws and modes of operation are diverse from those of any other force.

10. A mass of protoplasm moves and converts pabulum into living matter without any waste of either material or force. This, chemistry and mechanics cannot do. Let materialists produce, without leaving any chips in their workshop, a little speck of jelly throbbing with life, and it will be easier to believe that there is no "vital force" distinguishable from ordinary force.

11. The brain is not competent to secrete mind as the liver secretes bile. The relation of mind to brain is different from the relation of bile to the liver. No true analogy exists. Mind is not tangible.

12. Vital power is necessary to account for the difference between brain-cells, liver-cells, and nerve-cells. It is inconceivable that these—indistinguishable under the microscope—should produce such diverse results, if subject to no influence except that of physical force. Why is it impossible for the one set of cells to perform the functions belonging to either of the others?

13. There is life in the germ before there is any machinery in it. Why, then, should we affirm that living things are mere machines? If the "vital machine" dif-

fers radically from every other kind of machine, the term "machine" should not be employed. To employ it without an accurate statement of the respects in which it differs from the term as used to define life, is as unfair as it is unphilosophical. It assumes the very thing which is to be proved.

14. Inorganic matter, which is itself subject to the ordinary forces of nature, does not grow from within by taking matter unlike itself and communicating to it its own properties. Why, then, may we not apply the term "vital force" to that which is characteristic of life and is different from all ordinary forces?

15. Living matter moves and forms, self-impelled; non-living matter can do neither. Why regard two things which are diverse, as differing in degree, not in kind?

16. All animals, and pre-eminently human beings, have sensation and volition. Inorganic substances have neither.

17. All organisms have personal identity, though the molecules composing them are in constant flux. In what does the identity inhere, if there is no vital force?

18. Man, at will, can employ language expressive of inward feelings, thoughts, fears, and hopes. Matter cannot. Machinery does not start and stop at pleasure.

19. Man has self-consciousness. To apply the term machine, and without limiting its meaning, to a being possessing a consciousness of its own existence appears preposterous.

20. Embryos are, to appearance, the same. If there is no individual "vital force," what makes them to differ? Why does not the potato develop into an elephant; the dog-embryo into a Socrates; the midge-embryo into a monkey?

21. The matter of man is no more complex than that of other animals. He is subject to the same forces

of nature that other animals are. There is no force operating from inorganic nature upon him which does not operate on every living thing. Why, then, if he has no individual vital force, does he differ from other animals, being more intelligent, possessing moral convictions, and having religious impulses?

22. If there is no "vital force," what causes the various parts of every organism to be correlated? Is the question answered by assuming, as Professor Huxley does, that "a particle of jelly" is capable of guiding physical forces in such a manner as to give rise to exquisitely arranged structures? How came a "particle of jelly" in the brain so related to a "particle of jelly" in the toe as to report the prick of a needle and induce the promulgation of a decree for its removal, putting the organism into motion for the attainment of this result? Nor could chance have proved more successful than structureless bioplasts in adjusting all the parts of the body one to another.

23. Life is more than an aggregate of elemental units. St. Peter's, at Rome, is not a mere aggregation of grains of sand. As no one has been able to discover structure of any kind whatsoever in these elemental units, why regard a living organism as an aggregate of these? To say that what is designated as man's life is the aggregated life of the bioplasts which are at work in his body, is as if I should say that the laborers who worked upon the Brooklyn bridge were the architects of the structure.

24. Bioplasts may be living in man's body after it has become a corpse. Then some bioplasts, by an inexplicable blunder, were not aggregated into that life whose mystery they are supposed to aid in solving. The superintendent may depart, while many of the workmen are still living and blindly working on.

WHAT IS THE ORIGIN OF LIFE?

To this question various answers have been given:—

1. Life on the earth came from some other planet. This is, of course, no solution of the problem. It merely affirms that the life which exists on this planet had an extra-mundane origin.

2. Life originated itself. This theory has no basis upon which to rest except the exigencies of the evolutional theory. This, even Mr. Huxley admits. It is safe to assert that matter never could have originated a new set of molecular arrangements, thereby generating the bioplasmic elements from which bodies were self-constructed. To believe that a few atoms of matter chanced to combine once, and once only, in such ways as to originate "a homogeneous atom of plasson"; that this "primeval parent of all organisms," though organless, evolved higher organisms, by molecular changes between its own particles; that it moved forwards to the attainment of intelligent results, though devoid of intelligence and without a superintending agent; that there is no basic difference between the living and the not-living,—is to most minds impossible.

3. Life is the immediate creation of an Omnipotent Personality. This theory, which is more widely accepted than any other, maintains that every true species is a direct creation. It repudiates that form of evolution which assumes that all organisms are evolved from pre-existing organisms by forces inherent therein. It asserts: If, as is conceded, life must have been breathed into at least one organism by an Intelligent Personality, there is nothing unphilosophical in supposing that it may have been breathed into each distinct species. If one miracle must have occurred, as science is constrained to admit,

others may have occurred. God is eternally existent, and eternally omnipotent. He did not cease existence, nor cease to be all-potent, after creating one germ.

4. Life, as it now exists in various species, is an evolution from parental forms which were a direct creation of God. Life came from Deity, being an immediate creation *ex nihilo*. The various organisms in which it now pulsates owe their origin to creation by derivation from pre-existing species, or to evolution in some form not at variance with theistic conceptions of the universe, and not open to the objections which lie against all atheistic forms of the doctrine.

5. Life is a necessary and involuntary effluence from God. It is a drop from the fountain of His own being, possessing as He does, and necessarily must possess, life, consciousness, mentality, will, affection, moral-sense, etc. The life He possesses, being infinite, must necessarily flood the universe. As He is eternally active, His life must assume all possible forms. The totality of life in the universe is God. His life could not be infinite unless it were the life of all organisms. If plants and animals had an independent existence, in other words, if they were not an integral part of Him, an infinite life could not be regarded as one of His attributes.

6. Life is a volitional effluence from God. From Him, by an act of His own will, flows a limitless ocean of existence. Individual organisms are but drops of spray thrown up from the heaving sea of being. Between two vast durations, a past and a future, they throb with life for a brief moment, and sink back again into the billows, from which new personalities are incessantly emerging. "God is all and in all."

There are christian theologians who are indisposed to

permit pantheism to monopolize this last theory. Divesting it of the assumption that conscious existence may perhaps lose personal identity, they prefer it to any other speculative explanation yet furnished. Life is a volitional effluence from an Infinite Personality.

CHAPTER XIX.

MIND AND MATTER.

IN this chapter, and in chapters following, the reader is invited to consider the most important question which is engaging the speculative world,—What relation subsists between mind and matter? Is the former identical with the latter? is it one of its attributes? Is thought an effect of vibrations in brain-tissue, the vibrations being results of purely physical changes, the changes unavoidable consequences of the nutriment supplied to the system? Are ideas an evolution from the soil upon which we tread? Under the influence of air, shower, and sunshine, does the mineral kingdom impart to the vegetable the forces which pass under the designation "vital," being appropriated by man, either directly or through animal food? Are the intellect, the sensibilities, and the will, modified forms of matter or products thereof? Are mentality and its fruitage—hope, fear, joy, sorrow, gratitude, love—only transmutations of matter and ordinary physical force? Is man in every respect the child of evolution, in origin, in life, in character? Is human freedom but a spark emitted by the machinery of life, as the will is performing its allotted task in movements that are as irresistible as omnipotence, and as heartless as fate?

The discussion of these and similar questions neces-

sitates a consideration of theories which pronounce sensation, ideation, and volition simply molecular changes produced in the brain by a force inherent therein; which regard matter as the only reality, mind being one of its qualities or one of its modes of existence; which designate the two as "one substance, with two sets of properties, two sides, the physical and the spiritual—a double-sided unity."*

Accepting the assertion of Dr. W. B. Carpenter,— "Between matter and mind it is utterly vain to attempt to establish a relation of identity,"—we present evidence tending to confirm faith in the immateriality of the latter.

Other questions also press for solution. How is the immaterial connected with the material? Has it a special organ? or is it diffused throughout the body? If its seat is in the nervous system, in which part are its powers concentrated? Are they equally in all its parts, or are they resident in certain ganglionic centers,—the spinal cord, the medulla oblongata, the pons varolii, the crura cerebri, the quadrigemina, the corpora striata, the cerebellum, and the cerebral hemispheres? Is the mind, in its totality, in each ganglionic center, in part in each, or all in one? If all is in each, how shall we prove it an undivided unity? If part is in each, are we to understand that extension is a property of immaterial unity? If all is in one, in which is it resident, and how are its mandates communicated to other centers? As mental force and organic structure are so correlated that it is difficult to see how one can be active without the other, if indeed either can exist alone; and as we have no conclusive evidence that mentality is possible without physical organs,—are we to conclude that mind, like

* *Mind and Body*, Alexander Bain, p. 196.

the tissues it employs, is a result of growth and perishes with the organism? If the two are developed concurrently, are they inseparable as long as either exists? If not a concurrent development, which is effect and which is cause? Has the mind developed an organism adapted to its purposes? or has the organism evolved a mind which shall be its agent? Can mentality retain conscious existence after the material organism has perished? Can the organism continue to exist after mentality has departed? Is man's animal-life so far distinct from his mental that it can be maintained after all mind is lost?

How many and what are the faculties of mind? Is each correlated to a particular portion of the brain? Is each dependent for its vigor upon the quantity and quality of the brain-tissue it employs? Is each requisite to the mental constitution, being present in the new-born babe—in the human egg *ab initio*? If none are evolved, how are we to explain the fact that reason and conscience are in large measure dependent on education, even the adult being capable of acquiring new mental aptitudes, brain-tissue being so modified as to enable him to perform mechanical operations once impossible to him, almost inconceivable? If one or more faculties are capable of evolution, material agents being efficient in the origination of mental force, why may not other faculties be evolved?

Again: does belief in the materiality of mind preclude belief in its immortality? If, as science affirms, matter is indestructible, may it not be that matter in the form of mind—if mind is mere matter—may be indestructible, not merely in its essence, but in its form, as much so as the atom of gross matter is? If mind is an immaterial force, and by consequence, like all force, indestructible,

is it so inseparably associated with matter that when the body perishes, it is allied with other matter? And if being indestructible, it must continue to exist, and must continue its alliance with matter, have we any right to assume, without the shadow of evidence, that it may undergo conversion to such an extent as to lose the consciousness of individual existence and the sense of personal identity?

Questions such as these, momentous beyond comparison and intricate to the last degree, are exciting warm discussions in the present day. Without attempting their solution—a solution which even the ablest philosophers are unequal to the task of furnishing—we may legitimately undertake to present the fruits of modern research, as far as satisfactory results have been attained. Is mind equally diffused throughout the body? Is it divisible? Is the brain its organ? Is it no more than a form of matter? Is it an attribute of matter? Is it one side of a "double-faced unity"?

Before entering upon the discussion of these and kindred questions—all of which are exceedingly difficult—it is proper to acknowledge indebtedness to Drs. Carpenter, Ferrier, and Dalton, whose views commend themselves to reason and carry greater weight than the reasoning of those who advocate antagonistic opinions. Under the leadership of authors who have studied the subject thoroughly, and who manifest a sincere desire to rid themselves of prejudice, the reader may hope to secure reliable knowledge.

In order to present the subject in a manner fitted to leave an undivided impression upon the mind, it is necessary to consider, briefly at least, the several parts of the nervous system, and ascertain, as far as may be possible, the functions of each. After examining these as

minutely as the limits of the present work will permit, the reader, it is hoped, will be in possession of the facts upon which an argument can be constructed.

THE NERVOUS SYSTEM.

The Spinal Cord:—This, contained in the spinal canal and sending nerves to the muscles and to the epidermis, consists, on its outer surface, of a white substance; and within, of gray matter. The white substance is the medium of communication between the brain and the various parts of the body. The gray substance is a nervous center in which impulses may originate. These impulses are reflex in character, not volitional, as will hereafter appear.

The spinal cord is composed of the same materials as the brain; with this marked difference, however, that whereas, in the former, the gray matter is within, in the latter, the gray matter is on the surface; and whereas, in the brain there is an almost endless variety in structure, in the spinal cord there is a continuous repetition of the same structure.

Afferent and Efferent Nerves:—There are two sets of nerves; first, those which convey impressions to the brain, called afferent or sensory nerves; second, those which convey impulses from the brain to the parts of the body, denominated efferent, motor, or volitional nerves. It is only through the afferent nerves that the mind becomes cognizant of the external world.* It is only through the efferent nerves that volitions are communicated to the parts of the body. If the finger touches a hot iron, the

* These nerves invariably report impressions as received at their extremities, and not as received at some point along their path. Consequently, if a leg is amputated, the patient may feel pains in his foot; that is, the nerves, which ere the leg was amputated ran to the toes, convey to the brain an impression which is interpreted by the brain as a pain in the amputated foot.

afferent nerves convey an impression to the brain.* The will thereupon orders a withdrawal of the finger from contact with the heated surface. This order is conveyed by the efferent nerves to the muscle which moves the finger. A contraction of the muscle immediately takes place, and the injured member is withdrawn. If the efferent nerves in the finger were all severed, there would be no impression conveyed to the sensorium. If the sensorium were insensible to the impression, there would be no sense of pain, however severe the burning might be. If the efferent nerves in the arm were severed, there would be no volitional movement, though, as is frankly conceded, there would be reflex movement. It has been ascertained that a certain amount of time is necessary for the transmission of a sensory impression to the brain, for the brain to originate a volition, and for the transmission of this volition through the efferent nerves to the part to be moved. Dr. Ferrier has computed the time requisite in each of the three processes.

These nerves, both the afferent and the efferent, pass into the spinal cord, and constitute its white substance, the spinal cord being thus the only means of communication between the brain and the periphery. The impressions upon the periphery are consequently conveyed to the brain exclusively through the spinal cord, by the afferent nerves; and the volitions are transmitted to the muscles exclusively through the spinal cord, by the efferent nerves. Hence, as might be expected, the division of the spinal cord destroys at once all sensibility, and all power of voluntary movement, in the parts below the division, communication with the brain being severed. Consequently, there can be no further consciousness of pain in the parts below the division, for they have no connection with the sensorium; nor can volitions be

communicated to the parts below the injury, for the only means of transmitting them is destroyed, the efferent nerves being cut.

Still, after the spinal cord is severed, if the sole of the foot is tickled, convulsive movements are noticeable. They are involuntary, however; and originate in the gray matter of the spinal cord, which is a nervous center for corresponding regions of the body. There is no consciousness of the irritation and no volitional movement of the foot, the convulsive jerks being merely reflex actions. It is conceded that the spinal cord possesses functions as an independent nerve-center, as well as the functions it possesses as a medium of communication between the brain and the periphery. The impressions made on the integument are conveyed by afferent nerves to the gray matter of the spinal cord, whence an impulse may be sent along the efferent nerves to the muscles, causing them to contract. Such action is termed reflex, and of it consciousness is not a necessary attendant. The palm of a sleeping infant, if touched, will close. There is, however, no consciousness of the tactile impression. The same touch, if the child is in a waking state, would excite conscious sensation, and the closing of the hand might be either reflex or volitional. If a drop of acid is placed on the leg of a decapitated frog, the foot of the same side is raised to remove the irritant. If this foot is amputated, an attempt is made to scratch the irritated part with the mutilated member; after failure to accomplish the coveted result, the other foot is raised and the cause of irritation is removed. This, though regarded by some as an evidence of intelligence in the spinal cord, is considered by most physiologists, among whom are Drs. Ferrier and Carpenter, as a purely reflex movement, it being conceded that adapted actions, resembling those

which sensation and intelligence dictate, are possible to the spinal cord independent of consciousness.

If two frogs, one of which is rendered sightless and the other brainless, are placed in water and the temperature gradually raised, the former attempts to escape when the temperature reaches 25° C.; the latter remains quiet, being apparently insensible to the boiling process. Still, if acid is dropped upon the leg of the brainless frog, reflex action takes place. This seems to prove that the spinal cord is not a nervous center of conscious sensation; and that the brain is.

Again: if the spinal cord is severely injured immediately below the origin of the nerves belonging to the diaphragm, respiration, though imperfect, continues, and life may be maintained, sometimes for five or six days. Consciousness is retained. Vision is unimpaired. Hearing remains as acute as before the injury. The reasoning powers are as clear as usual. The victim is a living head, and nothing more. Hence, we are justified in concluding that the mind is not equally diffused throughout the body, but has its seat in the brain. Mind is seemingly an indivisible unity, its powers being concentrated in the head, though we are not warranted in asserting that mind, as a unity, has a local habitation in any one part of the cerebrum, but rather that intellectual activity, in its totality, is dependent on the conjoint action of many parts, whose several functions are capable of being in measure differentiated. True, grief causes tears to flow, and mental anxiety stops the secretion of saliva, and deep emotion interferes with the action of the heart, but the only legitimate inference from these facts is that different states of mind affect different classes of muscles without any exercise whatever of volition. It does not prove that grief has its seat in the ducts of the eye, nor

that anxiety has its seat in the fauces, nor that love has its seat in the heart.

Nor does the fact that some animals may be divided into several parts, each part becoming a distinct individual, prove that mind is divisible, and is diffused through the entire body. The animals which may be divided without causing death to the several parts, but producing new complete specimens, may be insensible in all the parts, having no true mind anywhere; or, they may be compound animals with several, perhaps an almost innumerable, number of centers of sensation, and possibly of volition, each part being capable of an independent life. Undoubtedly mere animal life may exist without either sensation or volition. Those animals, which live after division, exhibit no signs of possessing anything more than the power of reflex movement; and possibly have few if any properties higher than those which belong to forms of vegetable life which reproduce themselves from a single cell.

The Brain:--This is composed of various deposits of gray matter and of an underlying white substance. The latter, which is of a soft consistence, serves as a medium of communication between different sections of the encephalon, or as a means of receiving impressions from, and transmitting volitions to, the different parts of the body through either the afferent or the efferent nerves, sensory impressions being transmitted from the periphery to the gray matter of the brain, and volitions being transmitted from the gray matter to the periphery. The gray substance is of a still softer consistence than the white, and is cellular in its structure, and is abundantly supplied with blood-vessels.

In this gray substance the fibers of the white have their origin; and nervous force, which is regarded as

originating in the former, is conducted, directed, and utilized by the latter. The gray matter is not itself adequate to the origination of nervous force, the presence of scarlet blood being indispensable; that is, a fluid manufactured in the body, and having undergone a chemical change by exposure to air in the lungs, must circulate through the veins of the gray matter, or there is no nervous force. Sensibility, even in cold-blooded animals can continue only a short time after the supply of scarlet blood has ceased; and when the brain has become surcharged with dark-colored blood, some time must elapse before complete sensibility returns. Certain foreign substances,—alcohol, chloroform, opium, etc.,—are capable of producing a similiar insensibility. Indeed, unconsciousness may be produced in varied ways; and consciousness may continue long after the most skillful observer regards it as lost. It may even continue down to the time of death; almost to the moment of dissolution, as numerous examples incontestably prove. The fear of death which is so common to man in seasons of health, may be taken away, no doubt is taken away, as we draw near the hour of dissolution. The dread of dying, which is given us when we are to live, is generally displaced by satisfaction with life when we are die.

Some, accordingly, are disposed to regard every form of mental activity as a result of changes in the brain itself; which changes they regard as purely mechanical, or as closely analogous to the chemical changes which occur in inorganic matter, being similar to the phenomena which we refer to the agency of the physical forces,—light, heat, electricity, magnetism, and chemical affinity. They are unwilling to regard intellectual exercises as the activity of an independent mental force.

Possibly it is conceivable that the changes in the

brain, both those produced by the reception of sensory impressions through the afferent nerves, and the impulses which originating in the gray substance are transmitted through the efferent nerves, may be results of a force similar to that which produces the phenomena of electricity. It does not follow, however, that mind is an attribute of matter; nor that these changes in the brain may not be a result of mental force, which may possibly be as different from physical forces as these are different from inertia, impenetrability, etc. The elements of which the brain is composed exist, it is true, in the scarlet blood, and are obtained, in measure, from the air. This does not prove that the brain and the mind are identical. The elements in the scarlet blood undergo a chemical change before they are incorporated into the brain. This does not imply that matter can be so transmuted that mentality may be one of its properties. Again: the material elements which enter into the composition of the brain undergo a chemical change, during the process by which thought is evolved, before they are again received into the circulation. Does it follow that thought is matter, or some quality of matter? Does it follow that volitional impulses are material entities, or are modifications of physical forces?

It is conceded that science is at present incompetent to determine the character of the physical changes which take place in the brain in the process of thought; nor is it competent to the task of determining by what agency they are produced. Certainly it is premature to affirm that all these changes are produced by purely physical agents, though it is conceded that the more rapid these physical changes are, the more active the mind is at any given time. But that mental force is an effect, and not the cause, of these physical changes has not

been proved; and the freedom of the human will seems to render it more than probable that no such conclusion can be legitimately reached. An act of volition can set the entire mental machinery into motion. Is it possible to regard this act of will as a result of purely physical changes? If so, man is indeed under a fatal necessity, and is yet so deluded as to imagine himself free. Am I to conclude that ere I decided upon the form in which this sentence should be constructed, physical changes had taken place in the brain which irrevocably determined its structure, and the very words which should compose it? Are the changes antecedent to the volition? If they are, liberty is a delusion. If they are not, then mental force may set physical forces into operation. As a result of a volition to engage in a process of thought, the brain becomes active. This activity is accompanied by an elimination of salts containing phosphorus, the quantity of phosphorus being determined, in measure at least, by the amount of nervous activity. The act of will has produced physical effects, not alone in the brain, but throughout almost the entire organization, in the lungs, in the heart, in the kidneys, in the stomach, in the nerves, in the muscles.

It is idle, however, to speculate on the nature of the relation between mind and matter. We might as well attempt to explain the relation of gravitation to iron, or of electricity to amber. To regard magnetism as a form of matter would be no more unreasonable than to regard mentality as such; but magnetism, and as well light, heat, electricity, and chemical affinity, scientists persist in regarding as modes of motion, and of course immaterial. Why then may not mind also be immaterial? And as these several physical forces are uniformly found in conjunction with matter—though the impossibility of their

existence separate from matter cannot be proved—is there anything contrary to analogy in finding mental force associated with brain-tissue? And until it has been conclusively proved that each one of these physical forces is a series of molecular changes in matter, why assume that the more complicated force, *mind*, is nothing more than a succession of such molecular changes?

The principal divisions of the brain are:—the medulla oblongata, the cerebellum, the pons varolii, the crura cerebri, the corpora quadrigemina, the optic thalami, the corpora striata, the cerebrum. *

What are the functions of these several parts?

The functions of the medulla oblongata:—This is regarded as a complex center of reflex co-ordination. If the encephalic centers above the medulla are removed, voluntary motion ceases, though life continues. Reflex movements may be produced by stimulation of any region which receives its nervous supply from the medulla. Thus, the eyelids may be made to close, the facial muscles to contract, the tongue to move, the ear to

* “After reaching the foramen magnum of the skull, the spinal cord expands into the medulla oblongata. . . . Through this pass the efferent and afferent nerves, though it is difficult to trace the individual tracks of each. . . . The motor paths undergo decussation at the anterior aspect of the lower extremity of the medulla oblongata, at a point termed the decussation of the pyramids. . . . At this point, therefore, the path of the motor or efferent impulses from the hemispheres crosses to the opposite side of the cord. . . . Emerging from the medulla oblongata the tracks pass into the pons varolii. . . . The decussation of the various sensory and motor tracks is complete in the pons, hence destruction of one side causes paralysis of motion and sensation on the opposite side, and also paralysis of the cranial nerves on the same side.”

“Beyond the pons varolii and re-inforced by fibers derived from it and its connections, the tracks appear as two peduncles, or limbs, called the crura cerebri. On the posterior aspect of the crura, and anterior to the cerebellum, are situated certain ganglionic masses, termed the corpora quadrigemina, or optic lobes. . . . In the crura there is a distinct separation between the sensory and motor tracks. . . . The crura cerebri pass into the two great

twitch,—if the sensory nerves of these parts are irritated. If food is placed in the back of the mouth, deglutition takes place. These movements—possibly even when every center above the medulla is destroyed—are purely reflex. Volition is in no way connected with them; nor is the subject conscious of the movements.

It is also probable that the medulla is the co-ordinating center of the movements concerned in articulate speech, the mere movements being seemingly possible, though of course intelligent speech is not, since this demands the activity of higher nervous centers. Thus, a rat, if deprived of all the encephalic centers above the medulla, gives a cry, as if in pain, when the foot is pinched; but if the medulla is destroyed, no cry is heard, death ensuing without the utterance of any sound. As the medulla is the co-ordinating center of respiratory movements, which are purely reflex, of course breathing continues as long as the medulla remains uninjured; and as long as the possibility of breathing continues, there is also the possibility of uttering cries, which are also simply reflex actions. As soon as the medulla is destroyed, respiration—except in the case of cold-blooded animals, which live for a time by respiration

ganglia situated at the base of the brain. . . . One of these basal ganglia, the posterior pair, is called the optic thalami; the anterior, the corpora striata. . . . The optic thalami are ganglia of the sensory track, and the corpora striata, ganglia of the motor track."

"The cerebellum occupies a position above the medulla oblongata and pons varolii and posterior to the corpora quadrigemina. Its surface is disposed in the form of laminated folds, the gray matter which forms the surface exhibits on section the form of leaflets. . . . The cerebellum is connected with the medulla oblongata by two peduncles, termed the inferior peduncles of the cerebellum."

"The cerebral hemispheres form each a sort of hollow shell enclosing and overlapping the great basal ganglia."—*Functions of the Brain*, Ferrier, pp. 6, 7, 8, 9, 12, 13.

through the skin—is no longer possible, and death follows.

It is conceded that the mechanism of respiration is essentially reflex in its character, though, as is evident in the movements concerned in articulation and vocalization, it is subject in measure to the will. The control of the will over respiration is, however, very limited. By an act of will, we may cease to breathe for a brief time, it is true; but control over this reflex activity of the medulla cannot be long maintained. The will is forced to succumb. In like manner, the will has a limited control over the movements concerned in the expulsion of the foeces and the urine. The movements, however, are essentially reflex. The same is true in reference to sneezing and coughing. Each can be partially repressed. Each can be done in obedience to a command from the will; though both, and especially the former, are so essentially reflex actions, that the volitional can be readily distinguished from the automatic.

The pulsations of the heart are also modified through the nerves which center in the medulla. Of these nerves, one set accelerates, the other retards, the action of this organ. The former set can be excited to increased activity by muscular exertion.

The blood vessels are also to some extent under the control of the medulla.

It thus becomes evident that the medulla oblongata is the co-ordinating center of the reflex actions essential to the continuance of life; which is not a result of a series of volitions; nor can it be made to terminate by an act of will. As long as the medulla remains uninjured, even though all above it may be destroyed, life may continue. Respiration goes on. The heart continues to beat. Deglutition is possible, provided the food is placed at the

root of the tongue. The sensory nerves re-act to impressions. There is, however, no sensation in the proper sense of the word, that is, there is no consciousness of impressions made on the integument; nor are there any movements indicating intelligence. The mutilated organism is simply an automatic mechanism.

The functions of the mesencephalon and the cerebellum: —For the purpose in view, it is not necessary to enter upon the vexed question, What are the specific functions of each of the parts of the brain designated as the pons varolii, the crura cerebri, the corpora quadrigemina, and the cerebellum. Physiologists concede that it is not possible to differentiate with accuracy the functions of each. Accordingly, it is proper to confine the discussion to a consideration of the function of these parts in totality. What these are can be ascertained by removing from animals all the centers in advance of the quadrigemina, that is, by the removal of the cerebral hemispheres. The frog, deprived of the cerebral lobes, is capable of maintaining its equilibrium. Laid on the back it will recover its normal position. Placed on a board which is gradually tilted to one side, it will make the movements necessary to keep the center of gravity within the base. Pinched, it will hop away. Thrown into the water, it will swim. Stroked gently upon the back, it will croak. Placed in heated water, it will not remain quiet till boiled to death, as the frog will in which all the centers above the medulla have been destroyed. Thrust to the bottom of a vessel of water, it will ascend to the surface for air. It will hop around an object placed in the line of its progress.

Between the frog deprived of its hemispheres and the unmutilated specimen, there is, however, one marked difference. In the former, all voluntary movements are at

an end. Its movements are automatic. Memory also is destroyed, as is evident from the fact that the once timid creature now manifests no fear under any circumstances. It sits quiet, or if induced to move by a momentary impulse, moves ordinarily in a straight line till the impulse has exhausted itself, and then again lapses into quiet. Unless artificially fed, it will die of starvation, there being no will to appropriate food, and no memory of the past prompting it to associate food with the gratification of an inward desire; indeed, though dying of starvation, it can have no sense of hunger; and though pricked with needles, it can have no feeling of pain. There is no further consciousness of the condition of the body.

A pigeon from which the cerebral hemispheres have been taken is capable of maintaining a standing posture, and even of regaining its feet, if laid upon its side; also of flying, if thrown into the air. Left undisturbed, however, it remains perfectly quiet. Ammonia placed near its nostrils causes it to start back. A light flashed before its eyes causes the pupils to dilate. The discharge of a pistol produces a sudden start. Consequently, smell, sight, and hearing are not destroyed. After each active manifestation, caused by stimulation, it sinks back into a state of repose resembling profound sleep.

Like the frog, it has no power of volition, no memory, and no consciousness of pain. Unless artificially fed, it will die of starvation. It cannot be frightened by movements which produce fright in the unmutilated specimen. It gives no evidence of suffering pain, except movements which may be regarded as reflex.

A removal of the hemispheres from a rabbit is accompanied with like results. The animal retains the power of locomotion and of preserving its equilibrium. If it begins to run, it runs headlong. The pupils contract

under a strong light. The eyelids wink. A loud noise causes a sudden start. Acid placed on the tongue causes attempts to remove the irritant. If the feet are severely pinched, prolonged cries are uttered. Undisturbed, the animal remains quiet and dies of starvation in the midst of plenty. If food is placed in its mouth, it swallows and may be kept alive for an indefinite length of time.

The conclusion deducible from these and similar experiments is, that neither these centers nor those below them are in themselves capable of originating volitions or sensations proper. The mesencephalic centers and the cerebellar centers have as their functions, (1) the maintenance of equilibrium, (2) the co-ordination of movements concerned in locomotion, (3) the movements expressive of emotions. All actions in these centers are performed in response to stimulus communicated to them through the afferent nerves, except such as are purely reflex. In no case have they any connection with volition, intelligence, memory, or consciousness. Some movements originating in these centers seem volitional, it is true, and appear to manifest an intelligent adaptation of means to the accomplishment of a coveted result. They are volitional, however, only in appearance. When we come to examine the nature of the impressions which are the immediate antecedent of these activities it is found to be purely physical, not psychical. If sensation is to be defined as the consciousness of an impression, the question resolves itself into this, Is consciousness attendant on the activity of the mesencephalic centers? This question Drs. Dalton and Ferrier answer in the negative.*

* Dr. Carpenter, while asserting that "the motor fibers which pass from the brain, though commonly designated cerebral, cannot be certainly said to have a higher origin than the corpora striata" (p. 121), yet affirms, "Although every segment of the spinal cord and every part of the sensory ganglia, may be considered, in common with the cerebrum, as an independent center of nervous

Nor is the simple faculty of adaptation a proof of conscious choice. Such power of adapted action pertains in measure to the spinal cord, though no physiologist of any eminence regards the spinal cord as capable of conscious activity. It exists in the mesencephalic centers in greater complexity, because there is a much greater complexity of the afferent and efferent relations; but sensation proper, the consciousness of an impression or of a movement, it is conceded is not a function of these centers. Sensation, memory, intelligence, volition, and consciousness, have their seat in the cerebral hemispheres. Even the doubt which formerly lingered in the minds of some, whether the hemispheres were indispensably necessary to the momentary consciousness of tactile impressions, is now effectually dissipated by the fact that, if disease invades the crura cerebri, thereby practically detaching the hemispheres from the lower centers, there is absolutely no consciousness of tactile impressions in the opposite side of the body. Consequently, we infer that in the mesencephalic centers alone sensory impressions are not accompanied with consciousness, but that true sensation must be a function of higher centers. Neither equilibration nor locomotion requires the aid of consciousness, as is evident from the feats performed by somnambulists. Nor is consciousness needed in the movements expressive of emotion, as is manifest in watching the features power, yet this independence is only manifested when these organs are separated from each other; either structurally, by division, or functionally, by partial suspension of activity. In their state of perfect integrity and complete functional activity they are for the most part (at least in man) in such subordination to the cerebrum that they minister to its action, except in so far as they are subservient to the maintenance of the organic functions, as in the automatic acts of breathing and swallowing" (p. 122). "That the will should have a certain degree of control over such movements is necessary in order that they may be rendered subservient to various actions which are necessary for the due exercise of man's psychical powers" (p. 123).

of the dreaming infant. We may feign emotion, and we may also repress its manifestation to a considerable extent, but in a majority of instances the real emotion will exhibit itself in the features, despite all efforts to conceal it. Consequently, the co-ordinating centers of emotion must lie below the region of volition, of ideation, and even of consciousness.

Nor does the fact that the frog is capable of croaking, though deprived of its hemispheres, furnish satisfactory proof that it is conscious of the gentle strokes upon its back, which strokes elicit the sounds. The croaking is caused by the rubbing of the cutaneous nerves of the back. If the skin is removed, the croaking ceases, no matter how gently nor how forcibly the stroking is done. The action then is reflex, not volitional.

Nor are the corpora quadrigemina the center of conscious vision. The head of an animal from which the cerebral lobes have been abstracted is moved, it is true, when a bright light is flashed before its eyes. The movements, however, are regarded as reflex, not volitional.

In like manner, though a brainless animal starts at a sharp sound, conscious hearing is not regarded as a function of the lower centers. The movements, like those previously referred to, are considered automatic, not a result of volition prompted by the consciousness of having heard a sound.

Having reached the conclusion that intelligence, sensation proper, memory, and volition, are not functions of any center lower than the corpora quadrigemina, the reader is prepared for the further statement that the cerebellum is not the seat of these mental activities. The cerebellum is an essential part of the mechanism by which reflex action is produced, but is not the seat of intelligence, of volition, of ideation, of memory, or of

consciousness. Experiment has established this almost or quite beyond dispute. If the cerebellum is removed from a pigeon, instead of remaining quiet as the pigeon does from which the hemispheres have been ablated, it is in a constant state of agitation. It sees a threatened danger and makes efforts to escape, but is powerless. Equilibration and locomotion are lost. Sensation, volition, intelligence, and memory remain. In numerous experiments made by Dr. Ferrier upon birds and animals, similar results were found to ensue; *viz.*, disordered movements resembling those of intoxication, but no impairment of volition, of intelligence, or of sensation.

It seems, however, in the case of man at least, that science does not warrant the inference that the cerebellum is the center of the co-ordinated movements necessary to equilibration and locomotion. Persons in whom the cerebellum is entirely wanting, or in whom it has been completely destroyed by disease, have been able to stand and to walk, generally, however, with difficulty and in a tottering manner. Sensation, volition, memory, sight, hearing, touch, smell, intelligence, will, remain unimpaired. Locomotion is regarded by most physiologists as a function of the corpora quadrigemina. Certainly the above cases seem to prove that if these muscular adjustments are ordinarily functions of the cerebellum, they may at least be carried on independently of it. Perhaps the true theory is that equilibration and locomotion are functions of a conjoint mechanism; of which, when one part is destroyed, the remaining parts are capable, after education, of fulfilling the functions previously performed by the conjoint mechanism.

Though the question, What are the functions of the cerebellum? is one of the most difficult in human physiology, and one upon which great diversity of opinion

exists, there is nevertheless unanimity upon two points: (1) Volition, consciousness, memory, ideation, and intelligence are not among its functions; (2) Injuries inflicted upon it ordinarily produce only transient effects upon mental operations, and even from its complete destruction ultimate recovery is possible, its absence leaving no one of the faculties seriously weakened.

It is conceded, then, that sensation proper, volition, intelligence, memory, judgment, and the instinct of self-preservation, are not functions of any ganglionic center outside of the cerebral hemispheres. Are they functions of the cerebrum?

The Cerebrum:—This consists of a mass of white substance covered by a layer of gray matter, and is in the form of two ovoidal masses called hemispheres. Their surface is disposed in convolutions, the extent of each convolution being determined by fissures. At these fissures the opposite edges of adjoining convolutions lie in contact. Near these fissures the gray substance is more abundant; consequently, the more numerous the fissures, and the deeper they are, the greater the quantity of gray matter. Neither these fissures, nor the convolutions, are the same in all crania. Still, certain fissures and certain convolutions are essential features.*

* The more important fissures are:—

1. The longitudinal fissure; which separates the two hemispheres, dividing the brain into two equal parts.
2. The fissure of Sylvius; which, beginning back of the first temporal convolution, runs backwards and upwards, and is divided in man into two branches, one of which is denominated the anterior branch, the other, the posterior. The space between the two branches forms the roof of what is denominated the Island of Reil.
3. The fissure of Rolando; which, commencing near the median line runs nearly to the fissure of Sylvius.
4. The parietal fissure; which, starting behind the posterior central convolution, runs through the parietal portion of the hemisphere.

The cerebral ganglia, two in number, are at the base of the brain. The anterior pair are denominated corpora striata, and the posterior pair, optic thalami.

The Gray Matter of the Hemispheres:—This lies in layers on the surface of the convolutions, and into it the nerve-fibers of the white substance penetrate. It consists of nerve-cells with ramifying fibers. In the middle portion of the gray substance the cells are larger than on the surface and are termed “pyramids.” Each of these pyramids has its base directed inwards towards the white matter and its apex pointing outwards. The nerve-fibers from the white substance diminish in size as they enter the gray substance, and spread themselves in horizontal layers.

5. The praecentral fissure; running parallel with the fissure of Rolando, a little in front of it.

6. The superior frontal fissure; running nearly parallel with the great longitudinal fissure, and separating the first and second frontal convolutions.

7. The inferior frontal fissure; surrounding the end of the anterior branch of the fissure of Sylvius.

The principal convolutions of the hemispheres are:—

1. The first frontal convolution; running from near the upper end of the fissure of Rolando, along the longitudinal fissure to the anterior extremity of the frontal lobe, where it bends downwards and backwards.

2. The second frontal convolution; running parallel with the preceding.

3. The third frontal convolution; at the lower part of the frontal lobe and curving round the anterior branch of the fissure of Sylvius.

4. The anterior central convolution; running outwards and forwards from the great longitudinal fissure, along the fissure of Rolando.

5. The posterior central convolution; behind the fissure of Rolando and parallel with it.

6. The supra-marginal convolution; arching around the upper end of the posterior branch of the fissure of Sylvius.

7. The angular convolution; following the inferior edge of the parietal fissure to its posterior extremity, where it turns downwards and forwards.

8. First temporal convolution.

9. Second temporal convolution.

10. Third temporal convolution.

Differences in structure characterize extended sections of the gray matter. In front of the fissure of Rolando, pyramidal cells predominate. In the parietal and temporal lobes, small cells are more numerous than larger ones.

The White Substance of the Hemispheres:—This is nerve-fibers. These are of three kinds:—

(1) Commissural fibers. These connect similar parts of the two hemispheres. The principal mass bears the name of corpus callosum and is a broad band situate at the bottom of the longitudinal fissure, the individual fibers of which spread out to all the convolutions of the frontal, the parietal, and the central lobes. Next in importance is the anterior commissure, which connects those convolutions of the two hemispheres which lie below the fissure of Sylvius. It is through the agency of these commissural fibers that the two hemispheres are enabled to act in unison. As long as each hemisphere is in a healthful condition, and these connecting fibers are unimpaired, there is unity of action in the two associated halves.

(2) The fibers of association. These connect the convolutions of the same hemisphere. Of these, some unite adjoining convolutions; some, passing under two or three adjacent convolutions, connect those somewhat remote from each other; some run from one side of the hemisphere to the other, putting the most distant parts into immediate communication with each other.

(3) The medullary fibres. These connect the hemispheres with the medulla oblongata, and consequently with the spinal cord, and through it with the gray part of the organism.

Functions of the Hemispheres:—These, as has been shown negatively, are sensation, volition, and ideation,

for removal of the hemispheres destroys consciousness, voluntary power, and memory, leaving an animal a mere automaton, the movements which resemble those prompted by conscious sensation, intelligent adaptation, and volitional control, being regarded as simply reflex and having no connection whatever with mind, but having their origin in ganglia which are capable of being stimulated to unconscious activity.

On the other hand, as has been seen, the hemispheres are not to be regarded as directly connected with the maintenance of physical life. In quadrupeds large portions of them can be removed without impairing the vital functions. In fishes, reptiles, birds, and even in some quadrupeds, they may be entirely destroyed without causing death. In man, they may suffer extensive injury without destroying life. The cases are numerous which prove conclusively that the hemispheres are not indispensable to a continuance of the functions of animal-life.

It being thus rendered more than probable that the cerebrum, which is not indispensable to continued physical life, is the seat of intelligence in general, the reader may enter upon an investigation of the more direct evidence bearing upon this generally accepted theory. This will be presented in the succeeding chapter.

CHAPTER XX.

THE CEREBRUM THE ESPECIAL ORGAN OF MIND.

IN proof of this proposition, attention is called to the following considerations:—

1. Other things being equal, the size of the hemispheres invariably determines the degree of mental power. In idiots the circumference of the head above the ears is uniformly small, sometimes only 12 or 13 inches. The average well-developed head is 22 inches in circumference. The heads of savages are smaller than those of persons possessing average intelligence in civilized nations; consequently, as we might expect, their intellectual powers are feebler. The brain-capacity of the negro-race averages 82 cubic inches; that of the Anglo-Saxon, 100. The average weight of the negro brain is 46.9 ounces; that of the English and German is 52. The intellectual vigor of each race, and its success in the struggle of life, are commensurate with the size of the brain possessed.

2. The greater the mental strength and the more numerous the faculties in active exercise, the larger, as a rule, is the cerebrum. Thus, it is more fully developed in insects than in worms; more fully in birds than in reptiles; more fully in monkeys than in elephants, in proportion to the size of the body; more fully in man than in any other animal. Indeed, its development in the

several species of animals, and as well also in different individuals, is the measure of mental power possessed. In primitive races it was small. There is, it is true, a difference in the quality of the cerebral matter, as well as in the quantity. Still, whatever the quality may be, in all cases of marked difference in intellectual vigor, there is, as a rule, a perceptible difference in the size of the hemispheres as compared with the weight of the animal. Each species, and each individual in each species, possesses more mental power the larger the hemispheres are, other things remaining substantially unchanged. In animals possessing little intelligence the cerebrum is small, and its convolutions are few, if not entirely wanting. The posterior lobes are almost peculiar to man. The monkey has them, but they are small.*

Increased strength in certain faculties is also well known to be accompanied by an unusual development of certain sections of the hemispheres. A well-developed forehead indicates the possession of good reasoning powers. An unusually large development in any definite extended portion of the cerebrum indicates the possession of unusual faculties of a particular kind; and the possession of unusual powers leads us to expect an unusual development in some portion of the cerebrum.

3. If a portion of the skull is removed, the hemispheres are found, on examination, to be continually agitated

* Some animals, particularly insects, have what Dr. Carpenter denominates "unconscious cerebration." Ants, we are told, build houses, make diving bells, bore galleries, construct vaults, and erect bridges. They line their houses with tapestry, clean them, air them, and close them by ingeniously constructed doors. They prepare ware-rooms, devise traps, hunt, rob, and plunder. They have social laws, a common language, division of labor, and gradation of rank. They recognize those belonging to the same community, maintain armies, go to battle, send out scouts, post sentinels, carry off prisoners, keep slaves, and tend domestic animals.

during the time the mind is actively engaged, the agitation being proportioned to the degree of mental excitement. They are viewed as physical organs which are called into exercise during the activity of the mind. Unless this theory is accepted, it is difficult to resist the temptation to regard mentality as identical with physical changes, so intimate are the relations subsisting between psychical and physical states. These countless molecular vibrations, and these numberless physical changes have been viewed under three aspects: (1) As efficient agents in the evolution of thought; (2) As identical with mental activities; (3) As instrumental agents in the production of ideas, the mind, an immaterial force, being regarded as the true and only efficient cause. The first regards mental states,—sensations, perceptions, ideas, and volitions—as effects of a definite series of changes in a material substance, the changes originating in the substance itself, as a result of the operation of purely physical forces which are properties of brain-matter. What these sensations, perceptions, and ideas really are, it makes no effort to determine. It contents itself with pronouncing them effects of changes in matter. The second theory views mental operations as identical with these physical changes and molecular vibrations. Sensation is a change in a definite portion of brain-tissue. Volition is a change in the gray matter of the cortex. Thoughts are vibrations of matter. Imaginations are vanishing atoms wreathed into fantastic forms. Conscience, and its commendations and reproaches, are states of unstable matter. Memory is aggregated particles of matter stored away for future use. The third of the three aspects, under which these changes may be viewed, regards them as effects of the activity of mental force, the brain being the organ of mind.

4. The several faculties of the mind, and the mind in its totality, can be strengthened by judicious use. This seems to carry with it the inference that the brain, which may be strengthened by exercise in the same way that the muscle of the arm may be, is in all probability the organ of the mind. What is called "muscular strength," being in fact strength of will, may of course manifest itself with increased power if the muscles are repeatedly called into judicious exercise, the will thereby rendering them capable of greater exertion. Indeed, not only may the will impart unwonted strength to the muscular system, but its own power may be greatly augmented, as subsequent considerations will make apparent. In like manner, mental strength, of whatever kind it may be,—volitional, intellectual, sensory, or inferential,—and however vigorous it may be, is dependent, for the power of manifesting itself, upon the brain. Consequently, faculties may acquire increased power of manifesting themselves, by becoming possessed of more fully developed organs; and the mind, in its totality, may become more vigorous in its manifestations, in proportion as the entire brain becomes more fully developed by judicious exercise in psychical operations. Thus, an intelligent youth who passes his life in mental idleness becomes a stupid old man. A dull youth, if persistent in the cultivation of his intellectual powers, becomes the possessor of more than ordinary mental vigor. The phenomenon may be explained by supposing that,—as in the case of the muscle of the arm which may be strengthened by exercise under the direction of the will,—the physical organ of the mind, the brain, has been strengthened by judicious use under the superintendence of mental agents.

In like manner, in the use the intellectual faculties make of the brain as their organ, we may discover a

solution of the admitted fact that they lose their elasticity, causing a sense of mental weariness, if strained beyond their natural power, or kept under tension for too long a time. The intellectual languor is probably simple weariness of a physical organ, which is equal to only a definite measure of active exercise. Sir Walter Scott, in his early life, devoted about six hours daily to intellectual labors, and was eminently successful. After his accumulated misfortunes he labored to excess and became the victim of the brain disease which eventually caused his death.

The intimate relation between mind and matter is also observable in the results which are so liable to ensue on the sudden cessation of mental activities which have been long maintained. The business man who abandons employment under the mistaken conception that idleness will produce health and happiness, not infrequently finds himself the victim of bodily disease and of mental infirmities to which he was previously a stranger. Organs, through disuse, become in measure weakened, possibly diseased; and he who had sufficient intellectual vigor to amass a fortune, is now, it may be, scarcely competent to the task of guarding his possessions, though still on the sunny side of fifty. Possibly he might have retained his strength, his intellectual as well as his physical, if he had continued the judicious use of all his organs.

And it is well known that the will aids very materially in conquering diseases, those to which the brain is subject, and as well those to which the body is heir. A morbid sensitiveness to the approaches of death, or settled despondency in reference to the state of the health, invites the attacks of disease. The mind affects the body, the body affects the mind. The communication takes place

through the brain, which may therefore be regarded as the organ of the mind.

The mind is even capable of exerting an unconscious influence over the body, and no doubt over the brain, its organ of communication with the body. The man who, on testimony, is led to believe that a piece of steel suspended by a string will oscillate when held over certain substances and remain at rest when held over other substances, will find in all probability that such is the case, though the movements in the one case, and the rest in the other, can be proved to be results of an unconscious volition directing the hand. The mind, then, which can control the body without being in any degree aware of it, can be the unconscious agent in producing modifications in the brain itself, fitting it as an organ precisely adapted to its uses. If the billiard player who is intent on driving his ball to a certain point on the table inclines his head unconsciously in the coveted direction, and that too after the stroke is delivered—seeming to imagine it still possible for him to give direction to the ball—surely it requires no great stretch of imagination to suppose that the mind may be capable of producing physical changes in the brain, causing new particles to be incorporated into its structure, waste matter to be eliminated, new strength to be imparted, and unaccustomed “trills” to become easy through continued repetition. Certainly intellectual powers may be increased, may also be diminished, by the way they are employed; and it is possible to conceive that this may be a simple result of their possessing well-developed or poorly developed organs.

5. During sleep, the mind though unconscious of the existence of an eternal world and even unconscious of the fact that its dreams may be occasioned by impressions received from without, is nevertheless conscious of

changes in the hemispheres themselves. The dreamer may hold an extended controversy with an imaginary opponent, presenting arguments which he regards as those of an antagonist, thus actually losing the sense of personal identity. The reasons presented by the mind are regarded as presented by another, their authorship being seemingly unknown. The dreamer is not unaware, however, of the activity of his mental faculties. He may regard the arguments of his supposed antagonist as formidable, or as weak; and may proceed to refute them, or may pronounce them unworthy of an effort at refutation. From first to last, he is conscious of intellectual activity; that is, he is conscious that changes of some kind are taking place. The mind and its organ are in active exercise. The mind may regard a sentence as uttered, which it has delivered to the organism to be uttered. It may regard an antagonist as answered, inasmuch as the refutation has been elaborated in the brain; though it is rarely able to conceive that a blow has been delivered by the fist to a supposed enemy, unless it has been delivered, because the muscle in the arm has not been contracted. The organ by which thought is evolved is the brain. The organ by which a blow is delivered is the muscle of the arm. When the brain has undergone certain changes, the mind rests in the satisfaction of intellectual work done; when the muscle of the arm has contracted and delivered its force the mind rests satisfied. Each impulse must produce changes in its own appropriate organ ere the sense of completed work ensues.

The singular phenomenon of double consciousness, to which reference has just been made, is sometimes explained by assuming that the two hemispheres of the brain are amusing themselves. whiling away the tedious hours of the will's slumbers, by engaging with each other

in an intellectual sparring-match. The explanation does not carry with it the assumption that there are two minds; and, moreover, is seemingly an inadequate explanation, inasmuch as large portions of one hemisphere, and indeed an entire hemisphere, may be removed without serious injury to intellectual activity, and without even destroying the possibility of such double consciousness. Whatever may be the proper solution of the enigma, physiologists concede that the mind is a unit; indeed, this is a conviction from which we cannot escape.*

It is also conceded that the mind, during wakeful hours, can reproduce the visions of the preceding night, that is, can reduplicate the physical changes in the brain—the process by which the vision is made to reappear being of course purely automatic. There may be difficulty in distinguishing such reproduced visions from day-dreams; some are even incapable of distinguishing them from realities. Indeed, phantoms never before in

* In profound sleep, volition is wholly suspended; all other purely mental operations may be carried on, however, with entire regularity. The imagination may be active—perhaps invariably is. Hence, phantoms may succeed each other with surprising rapidity. Lord Holland fell asleep while a friend was reading to him; he had a succession of mental visions. On awaking, a description of what he had seen, and a recital of the ideas that had occupied his mind, required fifteen minutes. He was able, however, to repeat to his friend the former part of one sentence read, and the latter part of the next, the dream having occurred in the brief interval.

No doubt, there are laws which regulate this succession of images and ideas. They are unknown, however, and seemingly inscrutable. The order is not determined by the will; for, as Mr. Darwin was the first to prove, the will is in suspension during profound sleep. True, persons turn in sleep, and talk in sleep, and walk in sleep; but it should be remembered that there are different degrees of sleep—every conceivable degree, from the most intense nervous excitement, to complete and total insensibility. Certainly, in night-mare, there is an entire absence of will-power. The inability to move is not in consequence of disobedience, on the part of the muscles, to commands from the will; but in consequence of the absence of a volition, ordering the muscles into

the imagination present themselves to some minds, even when awake, with such vividness that they are mistaken for realities. They see ghosts, it is true—unsubstantial creations of their own active imaginations, which visions have to them the full force of reality, because the activities of the brain are so purely automatic as to escape notice. The physical organ, under the superintendence of mental force, is in a state of intense activity without the knowledge of the ego. It is perhaps possible in this way to explain the visions of Swedenborg. If he has deceived others, it is most probably simply because he deceived himself. He was no doubt perfectly sincere—his brain was presenting pictures fashioned from materials furnished it, and presenting them without his being aware of it. Deceptive appearances which are not mistaken for realities are very common; certainly, then, the possibility of their being viewed as real visions, and not as mental pictures having no objective reality, is entirely conceivable; indeed, it is demonstrable that they may be so regarded. The visions of the “biologized” subject have for him all the force of realities.

action. In such cases, and, according to physiologists, in all sound sleep, there is no voluntary exertion, either muscular or intellectual, though all other mental faculties may be in active exercise. The activity of the mind in sleep (as when one solves a mathematical problem which he could not solve in his waking hours) is to be regarded as purely automatic, being similar to that activity which goes on below consciousness, when, as often happens, after becoming confused with a multiplicity of unarranged facts and abandoning the consideration of the perplexing subject, the mind unconsciously arranges the confused materials in such perfect order—assigning each fact its appropriate place, and each argument its own niche—that, on re-examining the subject, clearness prevails where previously obscurity clouded everything; or, being similar to the unconscious activity which often takes place, when, after vainly endeavoring to recollect a fact or a proper name, we turn the conscious activities of the mind into other channels and presently are surprised on finding the forgotten fact or the lost name rudely thrust upon our consciousness, the obedient automatic machinery seeming to say, “There is what you ordered me to search for.”

6. In man, as in lower animals, the usual result of injury to the hemispheres, as also of electrical stimulation, is disturbance more or less marked to one or more of the mental faculties. Of some of these faculties the portion of the cerebrum which may be regarded as their special organ has been determined with considerable accuracy. In reference to others, as memory, reason, and judgment—endowments mainly concerned in intelligence—it is possible to frame an argument which renders it almost certain that these also have definite sections of the hemispheres as their organs.

(a) Sensation has its own organs, which are situate in the cerebrum. If the angular gyrus receives electrical stimulation of a certain degree of intensity, for a proper length of time, the eye-balls roll. Destruction of this portion of the brain in one hemisphere causes blindness of the eye of the opposite side. Still, if the angular gyrus of the remaining hemisphere is uninjured, the loss of vision is not permanent, the uninjured organ acquiring in time the power of doing double duty. If the angular gyrus in each hemisphere is destroyed, permanent blindness ensues.

Irritation of the first temporal convolution in one hemisphere causes a sudden movement of the ear, resembling the start of surprise which accompanies an unexpected loud sound. Destruction of a certain part of this convolution results in partial deafness in one ear. Destruction of the same portion of the brain in each hemisphere produces complete and permanent deafness.

Electrical stimulation of the subiculum excites the sense of smell, which is, of course, in such cases purely subjective. It also excites the sense of taste. To determine the precise location of each of these organs is, however, impossible, the seat of each being beneath the

convolutions; consequently, accurate differentiation is impracticable. As in the case of sight and hearing, so in the case of smell and taste, injury to this portion of the brain in one hemisphere seriously impairs the functions of these organs; complete destruction on each side entirely destroys the sense of smell and the sense of taste. It is an established fact that blows inflicted upon the skull, over the subiculum, sometimes produce temporary or permanent loss of these senses.

The removal or destruction of the parietal lobes abolishes the desire for food. Animals thus mutilated die of starvation in the midst of plenty.

Injury to the hippocampal region in one hemisphere impairs tactile sensation on the opposite side of the body. The paralysis is not a loss of the power to will movements, nor a loss of the power to execute the commands of the will in reference to the muscles of the affected side, but simply the loss of tactile sensation. The power to move remains, though the loss of sensory impressions is complete, and consequently there can be no consciousness of muscular contraction. Paralysis proper results from the injury of a different part of the brain. Still, without tactile sensation, the limbs become motionless, because no sensory impressions are conveyed to the brain over the afferent nerves, and consequently no orders for movement emanate from the will over the efferent nerves; or, if in consequence of vision an order does emanate, it is carried out with difficulty and only under the direct guidance of the eye. None of these movements rise into the region of consciousness.

Cerebral hemianæsthesia, which may be produced by an injury in the hippocampal region of one hemisphere, and which is a complete loss of tactile sensation, the power of volitional movement remaining nearly or quite

unimpaired, may be regarded, therefore, as furnishing conclusive evidence that the sense of touch has its organ in the cerebrum. An injury to a certain portion of the brain, or to the afferent nerves at their entrance into this region, causes the loss of both tactile sensation and of the consciousness of muscular contraction on the opposite side of the body. An injury to this portion of the brain in both hemispheres produces these results on both sides of the body.

(b) The center of volitions for movements of different parts of the body is also in the cerebrum, will-power of this kind being thus proved to have its own physical organ. Injury to a definite section of the frontal convolution in one hemisphere results in hemiplegia, or paralysis of one side, the opposite. Motality is lost on this side; but sensibility remains unimpaired. An injury to both sides causes paralysis of both sides. Sensibility continues, and the muscles, for example those of the limbs, may be in as healthy a condition as usual, and intrinsically as capable of movement as ever, and as capable of reporting their movements, but they are motionless and powerless simply because the will has no organ by which to communicate orders to them. As tactile sensation and the consciousness of muscular movement continue, it would seem to follow that afferent nerves cannot convey volitional impulses; or that these afferent nerves, which still convey impressions to the brain (which impressions are reported to the ego), have no connection with the volitional center of muscular movements;—both which, physiologists regard as established facts.

Those suffering from paralysis are sometimes conscious of expending much energy in the vain attempt to move the paralyzed member. Consciousness of effort is

not to be regarded, for this reason, as independent of muscular exertion; for, though the paralyzed limb remains unmoved, movements occur, the unparalyzed limb being sometimes violently moved; and even in cases which seem most clearly to prove that consciousness of effort may exist though no muscular contraction has occurred, there will be found to have been laborious contraction of the respiratory muscles, if of no others. Consequently, the conclusion now accepted by most physiologists is that in all cases of consciousness of exertion or a sense of weariness, there have been changes in some physical organ. Hence we infer that mental weariness is a consequence of the weariness of the mind's organ, the brain.

This sense of weariness, whatever organ may produce it, is dependent upon impressions communicated to the conscious ego through afferent nerves. If these are destroyed all sense of exertion is obliterated. The volitional impulse and the impression of having exerted muscular power do not travel along the same nerves. There is, as Dr. Ferrier asserts, "No physiological or pathological evidence in support of the theory that the motor [efferent] nerves are also the path of transmission of the impressions generated by muscular contraction." Consequently, electrical stimulation at the ends of afferent nerves, in the case of a person who has lost a hand, causes him to imagine he has moved the fingers of the lost member; but electrical irritation of the efferent nerves produces no such result. In the former case, he receives an impression similar to that which memory associates with the movement of the fingers, the stimulation of afferent nerves which once extended to the fingers actually reviving sensations stored away in the memory. Some persons who have suffered the amputa-

tion of an arm are capable of willing movements in the lost hand, and of executing them with satisfaction to themselves, closing it, opening it, pointing with the index finger. Possibly the pain which others feel in the amputated member may be due to the fact that volitions ordering movements in the imaginary hand fail in securing satisfaction; or, as previously intimated, to the fact that the afferent nerves are in a cramped condition in the "stump," and so report to the sensorium.

But whether sensation is restricted to an impression conveyed from the epidermis, as some maintain; or may also be produced by the revival in idea of an impression previously received,—it is an invariable consequent of an impression transmitted to the mind over the afferent or sensory nerves. This, however, is not a transmission to the centers first concerned in the volitional impulse, nor indeed to any efferent center, but to a sensory center. Still the mind, which originated the order of the will, receives the impression in reference to its execution. This seems to render it probable that the mind is a something, which, whether material or immaterial, is distinct from the brain, being an efficient cause, of which the cerebrum in its totality is an organ.

The differentiated centers of movement, as they exist in the gray superficial matter of the hemispheres, originate only volitions and never receive impressions from the periphery. The afferent centers, which are distinct from the efferent centers, receive only differentiated sensory impressions, and are not the recipients of commands from the will. Destruction of the former leaves the victim powerless in the use of some parts of the body, except so far as he may direct and guide the paralyzed member by the eye, though tactile sensation and the

inherent power of muscular contraction remain unimpaired. Destruction of the latter leaves him without the consciousness of muscular movement in the affected member, except so far as it may be received through vision, though will-force adequate to order the movement, and as well the power of executing the order, remain intact.

The electrization of the cortex of a particular portion of the frontal convolution of a monkey causes him to assume an attitude of fixed attention. Its removal leaves him without the faculty of attentive observation. Though not deprived of intelligence, listlessness characterizes his movements, accompanied with loss of interest in everything save passing impressions. It is well known that the frontal lobes in man may suffer extensive injury without producing any serious consequences, though they are certainly connected with efferent ganglia, nerves which radiate from the corpus striatum having their cortical distribution in these regions.

Basal Ganglia:—At the base of the cerebrum are two ganglia, the optic thalami and the corpora striata. These are masses of fibers, centers of convergence; the former, of afferent nerves; the latter, of efferent nerves. The total destruction of the optic thalami annihilates sensation,—touch, sight, hearing, smell, taste—though will-power remains unimpaired. Total destruction of the corpora striata abolishes the power of voluntary movement, though sensation continues. In man, there is but little difference between destruction of the efferent centers at the cortex and destruction of the corpora striata, except that, in the latter case, the effect is produced by one stroke in a limited area, while at the cortex the injury, to produce the same effects, must needs extend over a considerable area.

The corpora striata are the center in which habitual movement becomes organized. They are not the center of true conscious activity; but, as a result of education, they are capable of yielding to impressions whose origin is below the region of consciousness. A consciousness of impressions must precede every act strictly volitional; still, by frequent repetition, an act may become so easy as to follow impressions of which there is no conscious knowledge. Possibly, in the case of acts performed from habit, as in measure is true in the case of a well-trained public speaker, impressions may pass directly to the corpora striata below the region of consciousness. This may be true so far at least as the succession of ideas and the choice of words are conceived. It may also be true in the case of the dog whose powers of locomotion, possibly because running has become a habit, are not impaired by destruction of the efferent centers at the cortex. He runs automatically. Some regard it as doubtful whether in man habitual actions can become so entirely automatic as to be below consciousness, having no connection whatever with the volitional centers at the cortex. The questions pertaining to the automatic activity of the cerebrum will come under consideration in a succeeding chapter. For the present, the reader may safely adhere to the accepted theory that even if the optic thalami and the corpora striata in man are not sufficient to execute habitual actions they nevertheless do unquestionably relieve the cortical centers of activity to no inconsiderable extent. Though in mechanical and in intellectual activities requiring careful discrimination the convolutions of almost the entire cerebrum may be called into play, it is nevertheless true that in acts which have become easy through frequent repetition the basal ganglia perform the greater part of the work, leaving higher

centers free to employ themselves along other lines of thought.

When we come to consider the mental faculties more directly concerned in exhibitions of intelligence, viz., memory, reason, and judgment, we find, as in the case of conscious sensation and volition, that they have their seat in the cerebrum. Memory, without which articulate speech would be impossible, the empty present being hopelessly dissevered from the pregnant past, leaving very slender foundations on which to base a process of reasoning, is the most essential of the faculties upon which intelligent acts are dependent, and is regarded by physiologists as having its seat in the cerebrum. Its nature will come under discussion in a chapter following.

Reason, the ability to place a proper estimate on the various impressions received from ten thousand sources and to trace each effect to its proper cause, preventing us from assuming the existence of causes which have no efficiency, or from imagining that effects may flow from causes in which they are not contained, is not to be confounded with the simple power of perception and is unquestionably a function of the hemispheres. Judgment, a faculty which calls into requisition both memory and reason in order to supply itself with the materials upon which to base a decision, has its seat in the cerebrum, whether it is regarded as a separate faculty or as a result of adjusted relations between other faculties.

That these several manifestations of intelligence have the cerebrum as their organ is sufficiently evident, it is believed, from the fact that they have their origin in a sensation or sensations, and terminate in a volition, or in a series of volitions. The materials which they elaborate come to them from the senses, and after the elaboration is completed, an act of will is the result. In the case of

memory, this volition is a determination to retain facts deemed worthy of preservation, without which decision they may prove as transitory as the dissolving cloud, but in obedience to which they are stored away in receptacles for future use. In the case of reason, it is a volitional impulse, prompting to the acceptance of phenomena as having value sufficient and causal potency adequate to the establishment of a definite conclusion which the will may regard as irreversible. In the case of judgment, it is a decision that of the many agencies which might prove instrumental in bringing about coveted results, a certain agency, or combination of agencies, is best adapted to that end; accordingly, the will proceeds to issue an order for the employment of these instrumentalities.

As the issue, in the case of each of these faculties, is a volition, so also is sensation the source through which the materials necessary to their activity are supplied. Judgment, as is evident, requires the existence of reason and memory. Reason must of course receive impressions, either directly through the senses or from the memory, ere it can appreciate their nature and refer them to adequate causes. Memory can neither store away nor retain anything else than impressions.

This chapter may be appropriately closed with an enumeration of the more important conclusions reached:

1. The mind is an indivisible unity.
2. It has its seat in the brain and is not equally diffused throughout the body.
3. The brain is the organ of the mind.
4. There is a broad distinction between the afferent and the efferent nerves.
5. Severance of the spinal cord leaves the parts below the injury utterly powerless.

6. The medulla oblongata is a complex center of reflex co-ordination.

7. The mesencephalon and the cerebellum are co-ordinating centers of the activities connected with the maintenance of animal-life.

8. Removal of the hemispheres destroys the power of volitional movements; destroys memory, conscious sensation, ideation, intelligence, and the instinct of self-preservation.

9. The cerebrum is the seat of intelligence, volition, memory, reason, and judgment.

10. Volition, so far as physiology enables us to determine, has its origin in the gray substance of the cerebrum.

11. The cerebral hemispheres are the especial organ of the mind.

12. It is highly probable that definite sections of the brain are especially concerned in certain muscular movements and in certain intellectual activities.

13. The organs of sensation—touch, sight, hearing, taste, and smell—are localized in the cerebrum.

14. The power of willing, especially of willing muscular movements, and most probably of willing to retain ideas under the light of reason till a conclusion is reached, is localized in certain sections of the gray matter of the cerebrum.

15. The optic thalami are centers of convergence of sensory fibers; and consequently their destruction annihilates all sensation and destroys consciousness.

16. The corpora striata are the center in which habitual movements become organized.

17. In the absence of the hemispheres, the lower centers are incapable of originating any movements, except those which are purely reflex.

18. These lower ganglia are centers of immediate responsive actions; and of these only; self-conditioned activity being a function of the hemispheres, and of these alone.

19. The exercise of memory, reason, and judgment is conditioned upon materials furnished by sensory impressions, except so far as certain categories of thought are concerned.

20. The entire absence of the cerebellum leaves all mental processes unimpaired.

CHAPTER XXI.

MOLECULAR VIBRATIONS IN THE BRAIN.

MENTAL activities are not identical with molecular vibrations in the brain, nor are they a simple result of such vibrations.

In support of this proposition the following considerations are presented:—

I. The concurrent testimony of eminent physiologists.
Dr. J. C. Dalton says,

"The intermediate process between the sensation and the volition may be short and simple; or it may be long and complicated, involving the combined suggestion of many successive ideas. There can be little doubt that in either case, it is accompanied by actions of some kind in the gray substance of the cerebral hemispheres. But the nature of the nervous process accompanying mental action is unknown."—*Human Physiology*, p. 426.

If the "nervous process," whatever its unknown character may be, only accompanies "mental action," it is not, in the opinion of this author, identical with intellectual activity; and if the nature of this "nervous process" is unknown, we are not authorized in asserting that it is "molecular vibration" of which thought is a result.

Dr. David Ferrier affirms:—

"That the brain is the organ of the mind, and that mental operations are possible only in and through the brain, is now so thoroughly well established and recognized that we may without further question start from this as an ultimate fact."

"But how it is that molecular changes in the brain-cells coincide with modifications of consciousness; how, for instance, the vibrations of light falling on the

retina excite the modification of consciousness termed a visual sensation, is a problem which cannot be solved. We may succeed in determining the exact nature of the molecular changes which occur in the brain-cells when a sensation is experienced, but this will not bring us one whit nearer the explanation of the ultimate nature of that which constitutes the sensation. One is objective and the other subjective, and neither can be expressed in terms of the other. We cannot say that they are identical, or even that the one passes into the other."—*Functions of the Brain*, p. 280-281.

If, as is here affirmed, the brain is the organ of the mind, then it is fair, no doubt, to assert that mind exists as an entity which is not identical with brain, nor with the molecular vibrations of brain-tissue; and equally legitimate to declare that mind is not a product of physical changes. An agent cannot be identical with him in whose service he is engaged; consequently, brain cannot be the agent of mind and at the same time identical with mind. Again, if brain is the agent of mind, then mind cannot be a product of brain, for that would be to suppose that an agent creates, or at least occasions, the existence of him into whose service he enters; but reason clearly asserts that an agent cannot exist, as an agent, antecedent to the existence of him whom he serves; and though he who employs agents can create them, or at least can fashion them to his liking and tutor them to obey his mandates, or dismiss them from his service,—it is a gross perversion of ideas to assert, or even to imagine, that an agent creates, or even occasions the existence of him who employs such service. Consequently, if mind is a result of molecular vibrations in the brain, physiologists, instead of recognizing "the brain as an organ of the mind," ought to have been able to recognize mind as an agent or organ of the brain, and should have expressed themselves in language fitted to convey this idea.

It is therefore legitimate to assert, that as physiolo-

gists concur in regarding it as a "thoroughly well established fact that the brain is the organ of the mind," their united testimony favors the conclusion that mind is neither matter, nor a product of matter; that intellectual force is not identical with brain-substance, nor capable of being produced by its transmutations or by its molecular vibrations. They do not mean to convey the impression that mind is identical with its organ; nor that it is a succession of "trills" in its own organ.

Dr. W. B. Carpenter affirms:—

"It is now generally admitted that we neither know nor can know, anything of matter, save through the medium of the impressions it makes on our senses; and these impressions are only derived from the forces of which matter is the vehicle. . . . In fact, instead of matter (as some affirm) being the object of our immediate cognizance, and the laws of matter our most certain form of knowledge, there seems valid ground for the assertion that our notion of matter is a conception of the intellect, force being that externality of which we have the most direct—perhaps even the only direct—cognizance. . . . Mind, like force, is essentially active, all its states are states of change; and of these changes we become directly or immediately conscious by our own experience. . . . Now nothing can be more certain than that the primary form of mental activity,—sensational consciousness,—is excited through physiological instrumentality. . . . In what way the physical change . . . is translated into psychical change . . . we know nothing whatever. . . . There is just the same evidence of what has been termed correlation, between nerve-force and that primary state of mental activity which we call sensation, that there is between light and nerve-force:—each antecedent, when the physiological mechanism is in working order being invariably followed by its corresponding consequent. . . . Each kind of mental activity—sensational, instinctive, emotional, ideational, and volitional—may express itself in bodily movement; and it is clear that every such movement is called forth by an active state of a certain part of the brain, which excites a corresponding activity in the motor nerves issuing from it, whereby particular muscles are called into contraction. No physiologist can doubt that the mechanical force exerted by the muscles is the expression of certain chemical changes which take place between their own substance and the oxygenized blood that circulates through them; or that the nerve-force which calls forth these changes, is intimately related to electricity and other physical forces. . . . That mental antecedents call forth physical consequents, is just as certain as that physical antecedents can call forth mental consequents; and thus the correlation between mind-force

and nerve-force is shown to be complete both ways, each being able to excite the other. . . . It is obvious that the view here taken does not in the least militate against the idea, that mind may have an existence altogether independent of the body which serves as its instrument. All which has been contended for is, that the connection between mind and body is such, that the actions of each have, in this present state of existence (which is all of which science can legitimately take cognizance), a definite causal relation to those of the other; so that the actions of our minds, in so far as they are carried on without interference from our will, may be considered as ‘functions of the brain.’ On the other hand, in the control which the will can exert over the direction of the thoughts, and over the motive force exerted by the feelings, we have the evidence of a new and independent power, which may either oppose or concur with the automatic tendencies, and which, according as it is habitually exerted, tends to render the ego a free agent. . . . Material conditions, in fact, merely furnish the fuel and the mechanism: it is force or power that does the work.”—*Mental Physiology*, pp. 11, 12, 13, 14, 26, 27, 694.

Even Prof. Alexander Bain, who, with Tyndall, Huxley, Spencer, and Haeckel, may be regarded as a special champion of modern materialism, admits:—

“The inanimate and the animate are not so different as body and mind. . . . Extension is but the first of a long series of properties all present in matter, all absent in mind. Inertia cannot belong to a pleasure, a pain, an idea, as experienced in the consciousness: it can only belong to the physical accompaniment of mind—the overt acts of volition, and the manifestations of feeling. Inertia is accompanied by gravity, a peculiarly material property. So color is truly a material property, it cannot attach to a feeling, properly so called, a pleasure or a pain. . . . These three properties are the basis of matter; to them are superadded, form, motion, position, and a host of other properties expressed in terms of these—attraction and repulsion, hardness, elasticity, cohesion, crystallization, heat, light, electricity, chemical properties, organized properties in special kinds of matter. . . . Mental states and bodily states are utterly contrasted; they cannot be compared, they have nothing in common except the same general attributes—degree and order in time; when engaged in one we must be oblivious of all that distinguishes the other.”—*Mind and Body*, pp. 124, 125, 135.

2. If all mental operations are but manifestations of physical changes in the brain, there can be no such thing as freedom of the human will.

All physiologists, it is admitted, are prepared to con-

cede that mental activities are largely dependent upon physical causes,—upon the supply of oxygenated blood, upon the measure of perfection attained by the bodily organism, upon inherited tendencies which have given character to the physical organs, upon the influence of acquired habits which have imparted potency to certain parts of the physical organization, upon the strength and character of impressions conveyed to the sensorium, upon the condition of the nervous system, upon the quality and quantity of the food one eats, upon the process of digestion and assimilation, etc. The materialist, however, affirms that mental operations of every kind—sensational, perceptive, emotional, rational, and volitional—are not only largely dependent upon physical causation, but exclusively dependent thereon. He regards man as a mere machine, his sensations, his emotions, his ideas, his motives, and even his acts of will, being determined for him, not by him. Every change in him, and every act performed by him, is viewed as a necessary result of physical causes, the brain only acting as it is forced to act under impulses over which the ego has absolutely no control. From this it of course follows that all desires, all conceptions, all judgments, all motives, all determinations, all moral sentiments, all religious impulses, find their origin in purely material conditions. Every person is a creature of stern and inexorable necessity, a helpless child of nature, a mere automaton, whose hidden wires are pulled by uncontrollable physical forces; he is as irresistibly impelled to do what he does as the magnetic needle is impelled to point towards the magnetic pole. Consequently, he can neither incur censure, nor acquire merit. He cannot be in any respect different from what he is; and consequently is irresponsible for his conduct,

as completely so as the raving maniac. He cannot deserve commendation, nor is he justly amenable to any law, human or divine. The decisions of his will are results for which he is in no measure accountable.

That the human will is not so completely under the control of ungovernable impulses produced by physical agencies, but is capable of rising above the promptings which result from purely material conditions, and may mold outward circumstances in measure at least, is the conviction of every human being who has not speculated himself into skepticism in reference to the plain teachings of reason. It is safe to affirm that all, save those who have been long groping in the midnight darkness of materialism, are prepared to concede that man possesses the priceless boon of freedom; that in the will he possesses a power which, by virtue of its control over all mental operations, enables him to determine his opinions, to decide what amount of potency shall be accorded to any particular motive, and to elect his course of conduct. He is conscious of ability to form his own character.

Nor is this conviction, in reference to a self-determining power of the will, a mere delusion. It exists in greater or less measure in every rational being, and may be developed by judicious exercise. True, it may be allowed to grow weaker and weaker, till self-control becomes nearly or quite impossible, and the character becomes the resultant of inherited tendencies and of environing circumstances; but this does not prove that in the well-regulated mind the will has no determining power. Will-power may be completely lost, as in the case of the insane, whose actions may result from purely physical causes; but this evidently proves that in the normal condition of the mind, the self-determining power of the will is a reality and not a pure fiction.

Again: if the decisions of the will are not self-formed, but are consequents of material changes over which the ego has no dominion, then, manifestly, man ought not to be regarded as responsible for his conduct—no act ought to be viewed as reprehensible. It is, however; and this disposition in man to pronounce some acts criminal carries with it the conviction that the will is free. Criminality is not regarded as a form of insanity, for which it is unreasonable to hold men responsible. In every age and in every clime, man has considered his fellow responsible for conduct so long as reason is on its throne. When he has so far lost self-control, by reason of continued transgressions, as to be irresponsible for the criminal act performed, he is justly considered responsible for his irresponsibility; and when, as often happens, reason has fallen from her lofty pedestal, the will being no longer capable of controlling motives, ideas, opinions, and conduct, society regards itself justified in placing the unfortunate automaton under the will of another. Nor does physiology teach that in such cases the mind remains sound, the insanity being due to disordered or diseased material organs. It teaches that the real cause of the unreasonable and irresponsible conduct is that the will has lost its legitimate dominion, being no longer equal to the task of controlling mental operations.

Consequently, while physiologists admit that the activities of mind are determined in no small measure by material changes in the brain, they nevertheless insist that the will, in its higher operations at least, is so far beyond the reach of influences purely material that it may be regarded as free in the strictest sense of the word. Physical causes are not in themselves adequate to determine its decisions. This self-determining power of the will is the rock against which the waves of materialism

have been fruitlessly dashing themselves for centuries. It remains unmoved. The majority of mankind are indisposed to consider themselves mere machines driven by invisible physical forces. They are unwilling to believe the immoral as innocent as the moral, the murderer as guiltless as the philanthropist: they believe that human beings can merit praise and deserve censure.

Once more: if our volitions have their origin in molecular vibrations, or in physical changes of some kind in the brain; then, in case I will to carry forwards a process of reasoning, thereby setting the rational faculties to work, I must believe that material changes of some kind precede the act of volition, actually producing it. Whence comes the impulse to this act of will? It may come, some imagine, from without, and in that case may be conceived as having produced some material change in the brain, which change resulted in a volition. This, however, has by no means been rendered clear. Others conjecture that the impulse comes from within and may be regarded as having effected some slight physical change, which may by some possibility have issued in the volition. This has not been proved. When, during the process, I decide to pursue one line of reasoning in preference to another equally seductive, or when I select one thought from many that well up in the mind, each seemingly as well adapted to my purpose as another, or when, as frequently happens, I appropriate the thought which should have been ignored and choose one unfitted to the end in view,—what material change impelled the decision? Am I, even in my most purely intellectual processes, a mere puppet whose movements are determined by invisible strings, and so determined as to leave me under the delusion that I have done what was in fact done for me by an automatic machinery? If so, psychology may as well

surrender the field to physiology; indeed, in strictness of speech, psychology, if such views have a foundation in truth, has no field of operation, no forces, no laws, not even an existence—is a pure figment of the imagination.

That the will has no power of self-determination is so extremely difficult to believe, that it is safe to affirm, Few can be induced to accept the theory.

3. If mental activities are identical with molecular vibrations in the brain, then these vibrations, and the changes which accompany them, must differ in nature, in degree, or in duration, else the volitions could not differ. What causes these molecular vibrations, and the material changes which occur, to vary to such an infinite extent? Are the impressions which are conveyed over the afferent nerves different in every case? In purely subjective activities what causes volitions to differ? If the will is not possessed of the power of self-determination, there must be an almost infinite number of material causes, many of them possessing only an infinitesimal measure of potency, for otherwise the will could not reach the decisions it does.

Moreover, that not all these decisions are results of physical changes seems to be rendered probable by the fact that though the application of electricity to some portions of the gray matter of the cortex elicits muscular movements, its application to the frontal convolutions produces no manifestations,—no muscular movements, no subjective activities, no exhibitions of any kind whatever.

4. If mind and matter are identical, or the former is a product of the latter, then how shall we account for the fact that the mind may perform all its operations though one hemisphere is removed. Certainly, if all mental activities are caused by brain-substance, effects ought

to vary when the cause varies. Is it possible, other things remaining the same, that the half of a cause should be removed without producing a change in the effect? Dr. Ferrier says, "The physiological activities of the brain are not co-extensive with its psychological activities."

5. If mind and matter are identical in their substratum, it can only be, because, as Prof. Alexander Bain affirms, "Matter is a double-faced unity, with two sets of properties, the physical and the spiritual." Then are we under the necessity of believing that every atom of matter has two precisely opposite sets of properties, which are so conjoined that they cannot be separated without annihilating the atom; and of course psychological activities must correspond accurately with physiological activities. This, it is conceded by Dr. Ferrier, and even by Prof. Bain, is not the case. Hence we conclude that matter is not a "somewhat" in which spiritual and physical properties inseparably co-inhere.

CHAPTER XXII.

AUTOMATIC ACTIVITY OF THE CEREBRUM.

THOSE who regard man as a machine—thoughts, desires, judgments, and volitions being mere products of a self-adjusting mechanism which is kept running by appropriating air, water, food, and sunshine—are careful to remind us that not only are the spinal cord and the lower ganglionic centers capable of reflex movements, over which the will has no control and of which the ego may be unconscious; but that even the higher centers in the cerebrum have automatic activities which are independent of volition, and of which we may be totally ignorant.

As it is unwise to ignore facts, which are helpful, from whatever source they may emanate; and as truth is a welcome visitant in whatever garb she may present herself, and however unexpectedly she may knock for entrance at the door of the mind,—no harm can come from the following concessions: There is an automatic activity of the cerebrum; of this automatic activity the ego may have no conscious knowledge.

A brief examination of the evidence upon which these statements rest will aid in establishing the theory that the mind, though some of its activities are automatic, is not a mere machine run by unknown forces.

These automatic activities in the higher ganglionic centers are of three kinds, as they are in the lower gan-

glia. (1) Those activities which are purely automatic, like instinctive movements in the lower animals; *e. g.*, the selection by worker-bees (when no queen is produced) of worker-eggs or worker-larvæ not yet three days old, which, after being hatched or carefully deposited in elaborately constructed "queen cells," are fed on "royal jelly," causing them to come forth perfect queens, their bodily organization and their physical capabilities being thereby essentially changed;—the instinctive acts of a certain species of caterpillar, which, being accustomed to make its hammock in six parts, if taken from its completed hammock and placed in an incomplete one will finish it, or if taken from an incomplete one and placed in a complete one will add to its adopted home the parts it would have added to its own;—the instinctive acts of sucking and crying in the human infant born without a brain;—the movements in a human subject after division of the spinal cord. (2) Those activities which are secondarily automatic, that is, such as have become automatic through habit; *e. g.*, walking, which, though voluntary in the sense that we can start or stop at will, is capable of being continued after the will is withdrawn, soldiers having continued walking, as they have horseback-riding, when in profound sleep, in which state the will is inactive; in which secondarily automatic activities the nervous mechanism acquires the power of movement independent of volition, and acquires it as a result of the repetition of similar acts, especially during youth, when new brain-tissue in which such combinations may be established is more rapidly and more easily formed. (3) Those automatic movements which are effects of the two preceding causes—some unusual stimulus acting upon centers which are in a state of susceptibility to slight influences; *e. g.*, the convulsive actions

characteristic of epilepsy and hysteria; the running of an artificially hatched chick in obedience to the call of a hen; the alarm of a young fox on hearing the barking of the hounds; the sudden start man makes on hearing an unexpected sound; the closing of the eyelids when a bright light is suddenly flashed before them—which has sometimes happened in the case of persons who, owing to paralysis, were incapable of closing the eyes by an act of will; muscular contraction which, after being ordered by the will, continues without any further act of volition until an order to relax is issued. This muscular sense may be lost, a person being thereby rendered incompetent to determine the state of the muscles, for example those of the arm, except by the aid of vision; and consequently being incapable of holding anything in the hand, if the eyes are withdrawn from it, vision being necessary to keep the will in operation and to determine the condition of the muscles.

Automatic mechanism occurs, then, in the operations of the cerebrum. An animal, so far as it is ruled by instinct, is a mere automaton; but in proportion as it is directed by reason and by will, its purely automatic actions are limited in number. Consequently, if in the ascending series of organic beings, the self-determined activities of each are compared with the cerebral development, such a correspondence is discovered as leaves little room to doubt that the cerebrum is the organ of those psychical operations which pass under the designations, “rational and volitional.” When we come to man, in whom the cerebrum is most fully developed, the primarily automatic activities are comparatively few in number; the secondarily automatic actions—those originally initiated by the will, and which have become automatic only through continued repetition—are more numerous; and those

activities which result from the exercise of reason and will are so numerous as to indicate the possession of a self-determining power. The lower animals may have no volitional power of directing their mental operations, which may be regarded as purely automatic, being perhaps similar to the mental operations we carry on in dreaming.

Man unquestionably has the power of determining intellectual activities to no inconsiderable extent. True, in man as well as in the lower animals, currents of thought and of feeling may flow on under the guidance of association without any exercise of will-power, the stimulus being imparted either from without or from within, and the activity originating in the gray matter of the hemispheres. This activity may be considered a joint result of inherited tendencies, which have been modified by early education, and of past volitional activities, which by frequent repetition have become so easy as no longer to call for a direct act of will,—indeed, in exact proportion as the intellectual faculties are made to do the greater part of their work in obedience to direct volitional mandates, the automatic activities become expressive of ordinary modes of mental activity. Improvements thus secured, whether by the individual or by the race, are transmissible, automatic actions being thus rendered easier for each succeeding generation, and the progress of the human family being thereby insured. But though many activities of the cerebrum may be regarded as automatic, as much so as the activities of other centers, the will has nevertheless the power of controlling the current of thought by the simple intensification of those impressions which it elects from among the many conveyed to the sensory ganglia, some being conveyed over the internal senses and others over the external.

As we become conscious of these ideas, emotions, and judgments which have been previously elaborated by the automatic machinery, the will proceeds to choose some and ignore others, to magnify some and minify others, thus furnishing material upon which the automatic machinery shall subsequently work.

That we are not conscious of either the physiological or psychological changes which accompany the formation of ideas in the mind is tolerably evident from the fact that injuries inflicted upon the brain are not felt in the slightest degree; and of mental processes, we manifestly remain ignorant until their results are laid at the door of consciousness. As is well known, memory, working beneath the region of consciousness, frequently surprises us by laying some coveted word beneath the vision of the ego. Nor will it be denied that the process of reasoning may go on, and frequently does, without our knowledge, our judgments being sometimes matured and delivered over to the ego without our being aware of previous mental activity. The artist, whether he be musician, sculptor, or painter, recognizes his best conceptions (though products of materials which he has furnished) as results at which the mind has arrived without any knowledge, on his part, of its processes, or even of its activity. It is conceded, consequently, that cerebral centers, as well as lower ganglionic centers, can act not only automatically, but without our being conscious of their acting at the time.

The mind receives impressions from within as well as from without, as is evident from the fact that we are often presented automatically—as in dreams, or volitionally—as in waking moments, with pictures which are accurate reproductions of pictures previously present in the mind. Evidently, some ganglionic center has reported

an impression received from the cerebrum over the nerves of the internal senses, which impression is a reproduction of one originally conveyed to the cerebrum by the external senses, and retained there for subsequent use. In the automatic power, resident in the hemispheres, of constructing new pictures from old materials as well as of reproducing past impressions, a solution is furnished, some think, of spectral illusions, which not being excited by external objects and having no corresponding reality must of course be understood as originating in the mind itself.

That the activities of the hemispheres only come into the region of consciousness by being conveyed to some center in which they are reported, seems probable, inasmuch as precisely the same effects can be produced by ideas as are produced by sounds, sights, etc. One may call himself in sleep, the quality of the voice being so accurately reproduced in idea as to leave upon the mind the conviction that a certain friend called him. He awakes, and can scarcely persuade himself that his friend did not call him. The hemispheres have conveyed a past impression to the center of consciousness. What prompted the call, the sleeper does not know. He may not even retain the consciousness of having been dreaming. It is also well known that a "ticklish" person can be affected by simply pointing the finger towards him. The hemispheres, excited to activity by the mere sight of a harmless gesture, have sent a reproduced impression to the seat of consciousness.

There is, perhaps, or probably, one nervous center, and but one, through which we become conscious, alike of impressions from the external world and of changes in the internal world—from which center emanate the impulses to respondent action.

Many activities of the cerebrum may be regarded, then, as purely automatic; as when the thoughts run on, in accordance with suggestions, without determination by volition; or, as in muscular movements prompted by simple ideas either with or without the accompaniment of feeling. In the former case, the changes are determined partly by the constitution inherited from ancestors—which constitution was determined in measure by the habits of past generations; and partly by individual habits acquired through frequent repetition of the same or similar acts—acts done in the past, and the effects they leave on character being the most potent impulses in determining the conduct of the present. In the latter case, the changes are determined by intellectual or emotional impulses originating in the mind itself, in which impulses the will might have exercised a controlling influence. And of these automatic activities, whether originating in inherited dispositions or in simple ideas, we may be unconscious.

Until it has been proved, however, that acts designated "volitional" now receive, and from infancy have received, their stimulus exclusively from automatic centers, it cannot be legitimately asserted that the will has no self-determining power.

From the nature of the nervous system, sense-impressions travel in an upward direction (if they meet with no interruption) until they arrive at the cerebrum, no automatic movement being generated in their course. In passing through the sensory ganglia, they give rise to a sensation, which being transmitted to the hemispheres causes changes in their cortical substance, the results of which are, or may be, subsequently sent as an idea to the seat of consciousness and may find expression either automatically or volitionally. If the sense-impression is

interrupted in its ascending course, automatic movements result, the nature of the movement being determined by the point at which the interruption occurs.

If, after the impression has reached the cerebrum, the will for any reason is in abeyance, automatic activities may occur, ideas taking such complete possession of the mind as to excite respondent actions, as in cases where the will has become enfeebled; or when it is inactive, as in sleep; or when its energies are concentrated on something else, as when a speaker's automatic machinery is furnishing language and coloring to thoughts already committed to it for delivery, while the will and the reason are gathering truths which are to find expression in subsequent sentences.*

It may be profitable to enumerate the intellectual exercises which may be either automatic or volitional.

1. *Impressions*:—These, which are changes in the nervous system immediately antecedent to sensation, are essentially automatic, though they may be intensified by successive acts of volitional attention. By dwelling upon fancied ailments one may produce the disease he dreads. By directing attention to the evidences of recovery from sickness, he may secure return to health, and may become convinced that his restoration is in consequence of the remedies he has taken, though he has swallowed no medicine more potent than bread-pills, which being received from the hands of a physician, in the confident expectation that they would effect a cure, prove instrumental in healing imaginary ailments.

* Sir Walter Scott's amanuensis says that the celebrated author, while uttering the sentence to be copied, would frequently consult a book in his library, accumulating materials for subsequent passages, the volitional activities being in advance of the automatic, as was evident from the occasional presence, in the sentence uttered, of a word wholly inappropriate, but which, belonging in a subsequent sentence, would appear presently in its proper place.

2. *Sensations*:—The ability to locate an impression, which may be regarded as the first mental stage in a conscious sensation, is unquestionably automatic, whether we view it as an inheritance or as an acquisition under experience. Impressions from the external world are referred to the ends of the nerves which convey them to the sensory ganglia; and the process is purely automatic. In some instances, indeed in not a few, impressions are erroneously located.*

Nor can it be denied that the effects which these impressions produce upon the mind are determined in measure by the condition of the physical organism, through which they are interpreted to the consciousness of the recipient. In sleep, for example, there is diminished receptivity to sense-impressions; though, from the fact that unusual sounds though not loud, or exceptionally loud sounds though usual, generally awaken the sleeper, it is evident that the sensory ganglia are still receptive. So likewise there are states of excessive sensibility to external impressions, as in fevers. The measure of receptivity in each case is no doubt conditioned in part upon the quantity and quality of the blood present in the brain at the time; and the intensity of the sensation is measured, other things being equal, by the attention directed to the impression, that is, sensations may be augmented or diminished by an indirect exercise of the will.

The several sensations,—hearing, sight, smell, taste, touch,—which may be produced by impressions received

* Impressions made upon the cut ends of nerves, in the stump of an amputated arm, may be referred to the fingers. Pains in the hip-joint are reported as painful impressions in the knee. Disease of the heart is frequently reported as a pain in the arm. Pain in the stomach, induced by eating ice-cream, is located by some persons in the throat; by others, over the eye.

from the external world, and are primarily automatic, may also be produced by impulses conveyed from the cerebrum; that is, they may be purely subjective, and are either reproductions of sensations previously experienced or direct products of cerebral activity. Of course, such sensations, like those produced by sense-impressions, are essentially automatic. If one is fully persuaded that he has received a severe injury in any part of his body, he may experience acute pain, at least imagine he does, though the part is absolutely uninjured. Indeed, there are persons, the character of whose sensations can be made to depend upon the idea dominant in the mind at the time; even as there are some whose ideational and emotional states may be determined by the sensations reported from the attitude of the muscles. The "biologized" subject has the sensations which correspond with the ideas having control of his mind at the time. A person in a "hypnotic" state has ideas which are suggested by the tension given to the muscles;—a devout man, if placed upon the knees in an attitude of prayer, while in the "hypnotic" state, engages in earnest supplication to the Father of All. Thus, men, at least some men, can be made to feel what they expect to feel, to see what they expect to see, to smell what they expect to smell, to hear what they expect to hear, and even to do what the muscles suggest should be done, because it is usually done when they are under similar tension. Sensations, then, which cannot be distinguished from conscious sense-impressions, may be automatically produced by the cerebrum; and sensations, in which the will is apparently unconcerned, may automatically produce ideational states.

In like manner, joyousness and despondency are states produced, not exclusively nor even mainly, by

external conditions, nor by conscious volitional acts, but by an automatic adjustment of the several mental faculties, which adjustment results no doubt in large measure from the state of the physical health. The origin of these states is to be found in subjective conditions, superinduced in part by physical causes, over neither of which the will has any direct control, though it may be regarded as having an indirect influence. While a despondent person, as must be conceded, has no power of becoming cheerful by simply willing to do so, he can will to look upon the sunny aspects of life, to seek cheerful society, to afford healthful occupation to both body and mind, to ignore the existence of those misfortunes which depress his spirits, to divert attention from those rasping anxieties which wear upon the nervous system, and to secure for himself an environment which will render joyousness more easily attainable.

A similar course is always open to those who, in matters moral and religious, have become for the time being the helpless victims of circumstances. They may not be able in the present, it is true, to resist temptations to courses of conduct or to the acceptance of religious doctrines, which are unreasonable and even impolitic; but it certainly does not follow that they are powerless for all time to come, inexorable fate impelling them to courses which can only end in irretrievable disaster. They may resolve to pay more attention to motives which they have too long disregarded; to weigh arguments which, though unanswerable, have been scorned by them till folly has usurped the place of good judgment.

3. *Attention*:—This, which is the power of concentrating thought upon a particular impression or set of impressions, received either from within or from without,

is at first purely automatic. The child's mind is attracted by objects presented to it, independent of any act of volition. In the case of an adult, however, in whom will-power has been strengthened by education and exercise, attention, in reference alike to what is going on in the external world and to subjective states, is either automatic or volitional. Without an act of will he may have his attention directed to a beautiful landscape. By an act of will, he may direct special attention to it and may fix an appreciative gaze upon some one object in it, to the neglect of all else. In like manner, while volitional power is engaged in riveting attention upon a complicated process of reasoning, he may greet a friend without having any conscious knowledge of his friend's presence, or at least no such knowledge as will leave a remembrance of having met him, the attention bestowed being automatic.

Not only may attention be automatically, and even unconsciously, directed towards a particular object, but in some instances it cannot be withdrawn by an act of will. The stricken wife, at the bed-side of her dying husband, finds it almost impossible to divert attention from her unhappy condition. The lad who, while concentrating attention upon the successive steps in a difficult mathematical problem, is summoned to the ball-ground in order to decide whether his "nine" or his rival's "nine" are victors, soon discovers that his will is unequal to the task of riveting the mind upon the demonstration under consideration, no matter how strong his purpose may be, nor how ardent his ambition to secure a prize, nor how earnest his desire to be in readiness for the coming examinations, nor how great his fondness for "pure reasoning." The attractiveness of the game and of its accompaniments sets volition at defiance. The business man,

in the sanctuary, is listening to the claims of religion; but for six days he has been concentrating his thoughts upon a plan for rescuing his imperiled fortune from the grasp of unprincipled rascality. A new method of procedure has been devised in the active brain and sent thence to the seat of consciousness. His attention is instantly absorbed; and the will may command never so imperatively, "Heed the message of life," but the attention is still directed to the new scheme of escape from environing perplexities. He needs to have a remarkably well developed will to enable him to control this automatic impulse.

We should not fail to note, however, that the will may be strengthened in its power of securing fixedness of attention, whether upon impressions received from external objects or from internal states. Thus, a good musician can develop will-power to an extent which may enable him to single out any one part, or even the sound from any particular instrument, in a piece of music performed by a hundred players. The philosopher may acquire the power of continuing his process of reasoning, though acute disease is making such ravages in his physical organism as would throw him into intense agony, if attention was diverted from the subject under consideration. Impressions which would produce pain, even the most intense, if the attention were not engrossed in other matters, may thus be entirely unknown. The attention may be directed elsewhere by the force of the will, or by the attractiveness of some other object, or by the united influence of these two agencies. Some persons, possessed of strong wills, can so completely concentrate their thoughts upon a particular subject, especially if it is an attractive one, that they may remain nearly or quite unconscious of even severe pains.

Children can be made to cease crying from the pain of an injury, by being attracted to notice some pleasing object,—consciousness of the injury—that is, pain—ceasing, though of course the sensations continue. A soldier in battle may receive a severe wound without being aware of it until the excitements of the hour are past.

As impressions, which would produce pain if the sensory ganglia were disengaged and in a state of receptivity, may exist without affecting consciousness, so also changes may occur in the cerebrum of which we would become conscious if in a condition to notice them, but of which we may remain unconscious, the changes being not only purely automatic, if the will is not concerned in them, but absolutely unknown; and to affirm that such automatic activities are incapable of occurring without the knowledge of the ego is a pure assumption and one which the facts will by no means warrant.

Nor is it unworthy of note that as a result of attention long and frequently concentrated in the performance of any particular act, the several senses can be improved to an extent truly marvelous. The blind can read by simply passing the fingers over small raised letters, and by a mere touch of the hand can recognize a person after long absence. The sense of smell in savages becomes exceedingly acute. Hearing in the musician becomes sensitive to a degree nearly inconceivable. That the sense of taste can be greatly improved is evidenced by the results attainable by tea-testers, who can grade tea accurately by a single sip. We are not at liberty to regard these and similar results as the acquisition, through volitional attention, of an unusual power in determining the character of the impression made, for in those forms of somnambulism in which the attention is engrossed by a single idea, and as well also in "hypnotism,"

there is the same acuteness of the senses, though the will is in abeyance. Persons can be distinguished by smell, even by the smell of the gold ring taken from the finger. By the acuteness of what is denominated "the muscular sense," somnambulists walk along house-tops; and by the same agency "hypnotic" persons have been known to write a letter, without any assistance whatever from vision, with perfect regularity, the lines being equidistant, straight and parallel, the words at proper intervals, the i's dotted and the t's crossed.

Thus it becomes evident that impressions, which as we have already seen may be automatically registered, may also be automatically reproduced.

Without troubling the reader with an enumeration of the many ways in which attention may increase or diminish the intensity of sensations, alike those produced by external impressions and those received from cerebral changes, we content ourselves with the affirmation, that in reference to both classes of impressions attention may be either automatic or volitional. Automatic attention, whether concerned with external or internal impressions, is an involuntary absorption of the mind by an object or an idea in virtue of its attractiveness, or in virtue of the vividness with which it is presented, or in virtue of its adaptedness to the state of the recipient's mind, which adaptedness may be the conjoint result of the character of the impression and of the inherited or acquired receptivity of the sensory ganglia for that kind of an impression. Volitional attention is the self-determined direction of the faculties upon a sense-impression, or upon an idea, which the individual is solicitous of keeping within the mental gaze; and it is by this power of electing the objects upon which the mind shall employ its

energies, and of magnifying their importance by continued contemplation, that we are able to free ourselves from the thraldom of the automatic machinery. The will is capable of determining upon what the attention shall be riveted, not always and absolutely, but generally and with a measure of certainty that leaves us conscious of freedom in reference at least to all the more important duties of life; and even in those instances in which we feel ourselves powerless in the present to arrest the automatic activities of the mind, we regard ourselves as the creatures of present necessity simply because we have not wisely employed our freedom in the past, and we are strongly disposed to conclude that by a judicious exercise of the will for a protracted period of time, we may recover the liberty whose loss we so deeply deplore.

4. *Perceptions*:—These, which are notions formed in reference to the object which produced a sensation, may be automatic, as all psychologists concede, alike those who regard them as intuitive and those who view them as generalizations based on experience—the former regarding them as primarily automatic, the latter, as secondarily so.

Our perceptions of size, of form, and in measure also of distance, are automatic, except to the limited extent in which the will has the power of determining the elements which shall have most weight in their formation—this being done indirectly by fixing the attention upon that deemed most important. It seems difficult to rid one's self of the conviction that our perceptions are the result of protracted involuntary education, which commencing at the dawn of life is carried forwards with greater or less regularity till death, each perception being in fact a resultant of all past experiences in reference to the object which produced the sensation. The act is essentially

automatic, not volitional, as is also the conviction of its trustworthiness. Each is apparently an immediate and necessary consequent of the impression received.

This view is in no way inconsistent with the well-established fact that the power of perception can be augmented by the habit of volitional attention. For example, some deaf and dumb persons can acquire the power of "lip reading," interpreting movements of the mouth and the lips into intelligent words.

Nor is it inconsistent with the fact that any idea or emotion, which may be dominant at the time, may modify the perception formed in reference to any sense-impression. The imagination, under the influence of terror, can construct frightful pictures from very harmless materials, and can invest them with all the semblance of reality.

Nor is it necessary to assume a hostile attitude towards those physiologists who insist that even the moral sense, as it exists in children and in savages, is a specimen of automatic activity; since it by no means follows that in maturer years, and indeed even in children and in savages, direction may not be given to the automatic machinery by continued volitional attention to those higher motives which reason pronounces too important to be either ignored or belittled. There is indeed such a thing as the mechanism of moral perceptions, but how that mechanism runs, and what its product shall be, depend in no inconsiderable degree upon what the will keeps prominently before the mind. It is true, that man cannot determine, by a direct act of will and with unerring certainty, how healthful his moral offspring shall be, now that they have come to the birth; but he can determine to feed his moral nature upon such food that its children henceforth shall have certain general characteristics, growing out of those habitual states which

volitional attention has gradually developed without any interference with automatic machinery. I cannot stop the loom, it may be; nor can I determine what shall be the nature of its product, the materials being already in it and partly woven, but I can decide, to some extent at least, upon what materials it shall work in future, whether upon rags or upon golden fibers. It is possible to destroy worthless fabrics and to strangle illegitimate children.

5. *Ideas*.—The formation of ideas is less dependent upon changes in the sensory ganglia than sensation and perception are; indeed, in addition to the power of forming distinct mental representations of objects which produce sensations, the mind possesses the ability of forming ideas independent of sensations immediately received through sense-impressions. It is able to build new structures from the old materials stored away in memory. The past is indeed the father of the present; but the living representatives of former mental activities have an individuality of their own.

That ideational activities are in measure automatic seems probable from our possession of primary beliefs; from the fact that truths widely and warmly accepted by one generation tend to become intuitive convictions in succeeding generations, the modifications produced in the brain by their acceptance being capable of transmission by inheritance; from the possession, by some persons, of the power of performing exceedingly difficult intellectual feats by processes which are inexplicable, not alone by others, but even by those performing them—lads, who have received no instruction, and are totally incompetent to explain the methods pursued, being capable of multiplying large numbers and extracting their roots by mental operations of some kind, though

probably not by such as are employed by trained mathematicians; from the almost marvelous powers exercised without any direct volition by those possessing remarkable intellectual gifts, as by Mozart, Beethoven, and Haydn in music, by Shakespeare and Milton in poetry, by Raphael in painting, by Watts in invention—the conceptions which have rendered these names immortal having come into the region of consciousness from a state of automatic, unconscious activity.

While conceding that the mind may act spontaneously in the formation of ideas and in arranging the order of their succession, one is nevertheless justified in asserting that every person is conscious of intellectual freedom, being convinced that above the automatic machinery there is a controlling will. This may have its limits, it is true. It may be incapable of originating ideas, as all are prepared to concede; but from the ideas which well up in the mind, thrown into consciousness by the self-acting machinery, it may make a selection, and by fixing attention upon the elected idea may so deepen the impression it makes as to render all other ideas impotent in comparison therewith. Consequently, even though the process by which ideas are evolved is regarded as exclusively automatic—which it cannot be—nevertheless man's freedom is not imperiled. So long as he retains the ability, by fixing attention upon a set of ideas or upon their nexuses, of determining which shall control his conduct in any given case, he cannot be considered as the helpless victim of blind fate; and so long as he retains the power of thus directing the currents of thought and of selecting those which seem best adapted to enforce a conclusion in harmony with judgments maturely formed, he assuredly is not a mere thinking automaton.

The automatic activity of the cerebral hemispheres, as

manifested in the formation of ideas, is of course most conspicuous when the intellect is in an excited state and the power of the will is in partial or complete suspense, the mind being possessed by a succession of mental representations which may either be products of activity called forth by unconscious impressions, or may be results evolved in its own operations carried on under the region of consciousness—suggestions, of whose origin nothing is ascertainable. In like manner, all acts which are expressions of dominant ideas rather than of direct volitional impulse, may be regarded as automatic. It does not follow, however, that the ego is incapable of arresting these automatic movements. Certainly not. A word is misplaced as the epistle is written, the misplacement being the result of a temporary jumbling of the results of two processes, the automatic and the volitional. The automatic machinery is ordered to pause while corrections are made. This done, it is permitted to run on, performing its allotted work, while the volitional activities are engaged in generating new conceptions. While in a state of mental abstraction, the house is passed at which we intended to call. The will orders a halt. After turning round, and while the automatic machinery is engaged in doing allotted work, we again fall into an abstracted state, perhaps actually passing the house again. Somewhat irritated, the command is given, "Halt." We reach our destination because the will has proved master.

Consequently, strictly speaking, many of these so-called automatic activities may be regarded as automatic only in the sense that the will, which has ordered them, has no further concern in them, the extent to which, under a permissive decree of the will, they are left to themselves, and as well also the measure in which

their operations are unknown, being determined by the degree in which the will is otherwise engaged. Possibly all automatic movements are in some sense volitional, being initiated by the will, or having been so frequently ordered as to have become habitual, or being permitted. This seems possible from the fact that the will may act without our knowledge, as heretofore observed. Impelled by expectancy, the will may determine movements, without the ego being in any way aware of it. In many of the phenomena of spiritualism, there can be no doubt that the will is operative, and is free. The table turns at which spiritualists are seated in the confident expectation that it will turn. They willed it should turn. Prof. Faraday has proved that table-moving by spirits is table-pulling by those seated about it, "a pulling," of which they may be unconscious.

It follows, it is true, that human testimony, even when perfectly sincere, is not always trustworthy. This is no new revelation, however. Free agents may be doing what they are not conscious of doing, and what they persist in asserting they are not doing. The will, acting without the knowledge of the ego, may cause a piece of iron suspended in the hand to vibrate in specified directions over specified substances. It can cause a divining rod to testify to the presence of water or of a certain mineral formation.

As it is a well established fact that the will can act without our being conscious of it, nothing can be gained by an attempted denial. Nor does it follow that man is a mere automaton whose concealed wires are pulled by unknown forces.

The form of activity which passes under the term imagination is also essentially automatic, being, as all concede, a species of ideation. That this is not necessarily

dependent upon the will, all are prepared to admit, whatever definition they may feel disposed to give to the term. Those who prefer to regard it as the faculty "which gives to airy nothingness a local habitation and a name," concede that it is automatic. Those who extend it to include the faculty by which materials previously accumulated are brought into forms of beauty, will find it difficult, if not impossible, to deny that to "mirror forth the forms of things unseen" is to reproduce past images, or to construct new images from those reproduced forms. In either case, the process is as truly automatic as memory is. So also, if imagination is understood in its lowest sense, as the reproduction of past conceptions, it is unquestionably purely automatic.

Though imagination is thus primarily independent of volition, there can be no question that the will can place the faculties of the mind in a state favorable to the reproduction of past images, or to the creation of new ones; nay, it can institute a search for them, and though it cannot call them up directly, it can pull at the chain of associated ideas, till pictures which gratify the sense of beauty arise in the mind—new combinations of old images, or creations from materials unconsciously present in the store-house of memory.

6. *The Emotions*:—These are of two kinds: (1) Those which have an objective origin: (2) Those whose origin is purely subjective. The existence of the former is dependent upon the existence of an external object. The existence of the latter is dependent upon the existence of an idea in the mind. In the former, only the sensory ganglia are concerned. In the latter, the sensorium and the cerebrum are jointly concerned, the cerebrum furnishing the idea with which pleasure or pain is associated, and the sensorium effecting the union of the two.

To that class of emotions whose existence is dependent upon an external object belong the sympathetic feelings, as pleasure in another's favorable condition, pity, partiality, dislike, love, hatred, approbateness, an instinctive respect for "the power which seems to make for righteousness." These several emotions are automatically in the mind on the presentation of objects fitted to excite them.

To that class of emotions whose existence is conditioned on ideational states belong benevolence, malevolence, pride, ambition, veneration, hope, fear, covetousness—in short, any feeling associated in its origin with an idea. In emotions of this nature the idea conveyed to the sensorium excites automatic movements in the same way that sense-impressions do. Laughter may be produced by the remembrance of ludicrous incidents. A feeling of pleasure or pain may be excited by recalling sensations previously felt. The miser experiences a feeling of satisfaction on contemplating schemes for increasing his hoarded wealth. The devout christian is bowed in awe by dwelling upon the inapproachable majesty of the Infinite. The daughter, in her new home, though surrounded by everything attractive, is melted into tears by the idea that her mother's home is her home no longer.

The emotions, it is true, are in many instances purely automatic; but they are not invariably so. They are sometimes so powerful as to conquer the will; but they are quite as frequently under volitional control, especially in well regulated minds. Though they often furnish the motives which determine the decisions of the will, they are frequently obedient servants of the volitional powers. Some mothers, under the guidance of involuntary impulses, may indulge their children in practices which injure them and wound the heart that loved them,

not too ardently but too indiscreetly. Some fathers, by an act of will, control that form of love which is common to the animal creation, rendering it a most efficient agent in inducing the child to forego present gratification in the hope of securing future advantages, teaching him that by controlling transient emotions he can purchase enduring happiness. Being capable, through the possession of a well disciplined will, of rendering paternal affection subservient to the decisions of reason, he is qualified to recommend, and if necessary to enforce, the duty of learning to bring the emotions under volitional control; and that such control is attainable is evident, perhaps from his own example, more manifestly from the fact that the will is frequently engaged in a violent struggle with the feelings; and it is still more clearly evident in that muscles which are paralyzed to emotional excitement may be still obedient to the mandates of the will. The muscles of the eye and of the mouth, though rendered incapable by paralysis of producing involuntary movements indicative of emotions, may still be responsive to the will. Though no automatic movements can occur, volitional movements expressive of feelings can be executed.

That the will has, or may acquire, the power of controlling the emotions under a variety of circumstances is accordingly conceded by physiologists as frankly as it is by the majority of mankind, who concur in believing that rational beings may justly be held responsible for exhibitions of temper and for indulging their passions. This control, like that exercised over the formation of ideas, is not direct, it is true; but we may withdraw attention from dominant emotions and so leave them to perish, or we may determinedly fix attention upon something else, and by "the expulsive power of a new

affection" may enable the mind to escape from what would otherwise be complete thraldom.

The will may also prevent, in a majority of cases, the expression in act of the emotions struggling in the bosom, leaving them entombed in their cradle. This it can do by controlling the muscles which emotions might otherwise employ.

In those feelings which have their origin in subjective states, being the result of an activity produced in the sensorium by an idea communicated from the cerebrum, it is possible for the will to fix attention upon some other idea, thereby rendering it dominant, and so generating a new or even an antagonistic emotion. Consequently, for the impure thoughts, which being products of the automatic machinery involuntarily flash into the mind, we are responsible in so far as they are results of habitual states whose character our wills have not been exerted in rendering different; and if, as may be the case, these moral states are in measure an inheritance over which the will can exert only partial control, our ancestors were responsible. "The iniquities of the fathers are visited upon the children to the third and fourth generation." The visitation is not an arbitrary infliction, however, from the hand of an omnipotent Sovereign, but a natural consequence of character formed by acts done. On the other hand, neither do the effects of volitional control of the passions terminate with the life of the individual, but are transmissible to his descendants. Mercy is remembered to thousands of generations. Nor is this an arbitrary bestowment of unmerited favors, but a perfectly legitimate outcome of causes having an actual existence in the creature. The results of self-discipline are more enduring than those of self-indulgence, because volitional control, long continued, produces cerebral changes

radical in their nature, and permanent in their effects. Character formed under volitional determinations is more unalterable than character formed under temporary impulses.

Consequently, those who are disposed to charge God with unrelenting malignity towards the children of men, and to regard life as an almost intolerable burden, inasmuch as human beings, even from earliest infancy, may be weighed down with nearly irresistible tendencies to evil, would do well to remember that as there can be no merit in untried goodness, and as the choice of right ways leaves effects upon character quite as permanent, if not more permanent, than the effects of acts performed from automatic impulses, there can be no legitimate ground for charging God with injustice. He has simply set before us evil with its consequences, and good with its consequences, and left us free to choose either, assuring us that the consequences of neither are confined to ourselves or to this state of existence; and that judgment, in the day of the final reckoning, will be based upon the advantages enjoyed in the probationary state, even inherited tendencies being taken into account. No one, assuredly, will presume to affirm that justice required that the physiological changes resulting from right acts voluntarily chosen should be permanent and transmissible to posterity, while those resulting from evil causes should be transient and non-transmissible to children. Could God have presented man with a more powerful motive for shunning the wrong and clinging to the right than is found in the fact that the fruits of each are eternal to the individual, and may be an inheritance to children's children? A man's own destiny for time and for eternity, and even in measure the destiny of his descendants, is suspended upon the manner in which he employs

his volitional powers. If such motives are inadequate to deter one from evil, what can deter him? If there can be no real goodness except in the volitional preference of right to wrong, why charge our Maker with cruelty?

Consequently, as is evident, there is no difficulty whatever in securing a scientific basis for the assertions of Scripture that "out of the abundance of the heart the mouth speaketh;" that "out of the heart are the issues of life." Certainly science teaches with unmistakable clearness that the currents of thought determine the acts of life. The past is father of the present. Present character is the legitimate child of past conduct. Dominant ideas generate emotions. Emotions impel to acts. Actions, especially if they become habitual, distil into character. In each stage, the will is conscious of freedom. It can determine which ideas shall be consciously present and dominantly operative in the mind. It can decide which motives shall remain in the ascendancy. It can decree which acts shall be performed. It can ordinarily execute these decrees. The effects it is capable of producing may not be produced directly, as they frequently are not; but as it unquestionably can produce them indirectly in a majority of cases at least, the results are the same as if they were direct consequences of an immediate volition.

7. *Memory*.—In this there are four essential constituents, registration, retention, reproduction, recognition. The impression is recorded in the brain. It is retained there by a process of nutrition. It is reproduced therefrom. It is recognized as a reproduction of a previous state of consciousness.

The process of registration is a series of physical changes produced in the brain by some change in the nutrition it receives. Material particles, received from the

blood, are deposited in groups of nerve-cells and nerve-fibers; which structure is the material representative of the facts deposited. As these tracks and scars constitute connected systems, one idea suggests another as we reproduce the previous states of consciousness. The association of ideas is due to the connected series of material atoms which constitute the physical registration. This is conceded by physiologists. That the process is dependent upon nutrition received from the blood seems exceedingly probable from the following considerations; what is soon learned is soon forgotten, probably because insufficient time is allowed for the production of enduring changes in the brain-substance;—what is thoroughly learned, being made a part of one's mental furniture, is remembered for a long time, likely for life, probably because enduring material changes are effected in the brain, rendering it certain that association can call up the registered ideas;—an injury to the head causing temporary insensibility leaves one without the power of recalling events which immediately preceded the injury, seemingly because, owing to the shock to the system, nutrition from the blood has not been furnished with which to register the events, or because, as in the case of ideas hastily committed to memory, time sufficient during a state of consciousness was not allowed for their effectual registration;—one commits to memory more readily when well and unwearied, because, as seems most probable, the brain is more active and the blood less deteriorated, the process of registration by the formation of tracks and scars being consequently more rapid and more effectual;—impressions registered in youth are more enduring than those registered in old age, apparently because the brain can be most modified during its growth, when a sufficiency of

healthful blood is furnished for the formation of new nerve-cells and new nerve-fibers;—we reproduce an idea or a sensation which was once within the region of consciousness, but eludes our grasp for the present, by calling up an associated idea, thereby setting the train of material representatives of past thoughts into motion.

These scars and tracks (which may be regarded as the physical basis of memory), whether they are the material representatives of nothing else than ideas, as some affirm, or are representatives of sense-impressions as well as of ideas, as others assert, may unquestionably be produced by purely automatic processes without any conscious assistance from the will. The record can be made without any direct act of volition; still, as no one denies, the will can render the registration more rapid and more enduring by riveting attention upon the ideas to be registered, thereby causing the wide difference between ideas temporarily lodged in memory, and those permanently laid away in its enduring structures.

The retention of ideas registered in the brain is effected by the maintenance of the material structure originally produced. The continuance of this structural registration is secured, notwithstanding the waste continually going on, by the deposit of new materials in the exact form of the old, the new being received from the blood and the old being carried out of the system. Consequently, though the brain undergoes a complete change in every material atom once in every seven years, or once in each year as science now affirms, the material tablet remains essentially unchanged; and, as a result, ideas committed to memory in youth remain with us down to old age—some even affirming that facts well imbedded in memory are not obliterated till death. Those received in youth and early maturity, being effectually registered by

consequence of the vigor of the constitution and the quality of the blood, are retained, that is, reconstructed in new tissue; those received in later years are more readily effaced, because, owing to the impoverished condition of the blood, little more is possible than the maintenance of structures previously perfected, the diminution of nutritive activity leaving new structures to be but imperfectly formed, and consequently effaceable.

In this constituent of memory, automatic activity is a primary element; still, it cannot be denied that the will can assist very materially in securing the retention of ideas in the mind. This it can do by indirectly calling up the treasured ideas, their mere presence again in the mind rendering it far more probable that the material structure will be effectually perpetuated. It is no doubt owing to this assistance rendered by the will, that the youth, by frequent reviews, ensures the retention of a science whose facts might otherwise slip from memory. The reviews deepen and perfect the furrows made in the brain by the facts entrusted to the keeping of memory. It keeps them, because the material structure, which represents them, is kept in good repair by the exercise of the will in putting it in order and guarding it against decay.

The third constituent of memory is the reproduction of ideas, possibly also of sensations which were previously in the consciousness. This is effected by a pull upon the train of associated ideas, which ideas, by consequence, come trooping into the region of consciousness. Of course, only an infinitesimal part of our knowledge is at any one time within the sphere of consciousness; and the aid we derive from memory in the ordinary business of life, and as well also in processes of reasoning, is dependent, in large measure, upon the promptness and accuracy

with which past experiences can be reproduced when needed. What has been learned is probably always in memory, though often in very shadowy outline; and is always known, provided we can immediately reproduce it as occasion may require. Some of our garnered knowledge, especially that which we frequently employ, is within easy reach; some, we are sure, we have in the recesses of memory, but we are not able at present to produce it, having seemingly forgotten where we deposited it, and how we labeled it; some, we conjecture, was never in mind, though circumstances may prove that it was and still is.

This reproduction of ideas may be strictly automatic. This is manifest, because, as numerous instances prove, the scenes, the incidents, and the ideas of early infancy, though entirely forgotten, apparently never within the sphere of consciousness, may be reproduced on revisiting the home in which our wondering eyes first received impressions from the external world; nay, instances can be furnished in which persons in advanced life have had pictures presented to the mind which they recognized as reproductions of past states of consciousness though unable to explain when or where they received them, being greatly astonished to learn from others that they were reproductions of scenes upon which their eyes rested in early infancy. Of course, in all such cases the reproduction is purely automatic, being occasioned by mere presence amid the surroundings of infancy, or by some accidental occurrence which started a train of ideas leading to the revival of traces which were still in the brain, though unaccompanied with the ability to determine the time and the circumstances which attended their formation.

In like manner, during fevers, persons have been

known to repeat ideas and quote passages, and even speak foreign languages, which in hours of health they were totally unable to do, the automatic machinery reproducing that which, though once within the region of consciousness, perhaps sixty years before, has long since been so completely forgotten that no effort of the will could have brought it again within consciousness; indeed, cases are on record in which persons, during the delirium of fever, have reproduced ideas which must have been impressed upon the memory when they were totally unconscious, unless the unconsciousness was only seemingly complete.

This at least is conceded, the reproduction of ideas may be strictly automatic, purely physical changes effecting not only what volition may sometimes effect, but in some instances reproducing what volition is unable to reproduce.

Nevertheless, the will has a powerful indirect influence over the machinery by which ideas are reproduced from the store-house of memory. Recollection is in fact the exercise of the will over this machinery, setting it in operation for the discovery of ideas which we have once possessed, and know we have, and which we now want. Conceding that we cannot call up the coveted idea by a direct volition, it is still true that by riveting attention upon ideas known to be associated with the idea we are in search of, the will can order, and in most instances can secure, its presentation in the presence-chamber of the ego. If, after following the series of ideas which the known idea calls up, we fail in discovering our missing child, we choose another leading idea and examine minutely every entrant within the door of consciousness, continuing to repeat the process till in the ideas which pass under the vision of the ego, presented by the automatic machinery, we recognize the features of the

truant whose hiding-place was such an obscure corner that we were compelled to pass along several pathways ere we could discover him and drag him into the light again.

The fourth constituent of memory is recognition. The reproduced idea must be recognized as a revived experience. Without this recognition there would be no past for us, only a teeming present. Neither would there be any sense of personal identity, the ego of the present being totally unconscious of an existence continuing from the past.

This recognition of reproduced ideas and states as resurrected experiences is essentially automatic. Of course, we cannot will to recognize them. We recognize them spontaneously, or we do not recognize them at all; still, by an act of will, we may keep them under the mental view while we examine them, noting resemblance and dissimilarity. There is, it is true, no volitional recognition of reproduced ideas; but by fixing attention upon them we can decide whether they are accurate reproductions. Sometimes, in fixing the inward gaze upon them, we recognize them as perfectly correct revivals; sometimes, as only partial revivals; sometimes, as little better than gross perversions, though we are not able to specify the respects in which they differ from their originals.

8. *The Will*:—Having seen that there are cogent reasons why we should frankly admit that not alone in animals but also in man, and even in his perceptions, his ideas, his emotions, and his memory—as in his muscular movements—there is an automatic activity as well as a volitional, we come now to consider the question of man's freedom.

According to Dr. Carpenter, “Will is a determinate effort to carry out a purpose previously conceived.” This

definition, it is believed, ought not to be regarded as entirely satisfactory. Whence this previous purpose? Does not purpose imply will? Is there will prior to will? or is this previous purpose an effect of automatic machinery acting antecedent to the possibility of volition? That he does not wish to be understood as teaching that the term will is a convenient synonym for the outcome of an automatic activity resulting from physical changes is evident, because he presents a series of arguments to prove that "the will is something essentially different from the general resultant of the automatic activity of the mind;" indeed, he regards it as a "power which being completely independent of physical conditions, is capable of acting against the preponderance of motives." It is possible to accept the conclusion, and inasmuch as there is every conceivable measure of volitional power, from simple volitional permission continued without our knowledge after being consciously initiated, to an efficient force directly exerted in the production of coveted results, it is probably safer to acknowledge that science is as yet incompetent to furnish a definition of the term, not being at present in possession of all the facts, and consequently being more likely to produce misconceptions than to promote clearness.

CHAPTER XXIII.

THE FREEDOM OF THE WILL.

BEFORE entering upon the question of man's freedom, it may be well to enumerate the propositions which may be regarded as sufficiently well established to answer as a foundation for future structures.

1. In a healthful organism, the will, under all ordinary circumstances, is capable of putting into activity those muscles whose movements are necessary to the execution of self-formed purposes; indeed, is capable of putting into activity all muscles except those termed involuntary, viz., those of the heart, the iris, the coatings of the stomach, and the intestines.
2. In a well-disciplined mind, the will is capable of so far determining the motives which shall effectually control its decisions that it may be properly regarded as a self-determining agent.
3. From the emotions which momentarily well up in the mind, the will is ordinarily capable of selecting those which shall furnish determining impulses resulting in courses which the judgment pronounces advantageous.
4. In the formation of ideas, the will can decide which shall remain under the vision of the ego, and may thus determine the succession to no inconsiderable extent; and is also capable indirectly of giving potency to ideas which might otherwise have but little cogency.
5. From the treasures lodged in memory, the will can

procure what the ego needs for present use, procuring it, however, by an indirect method; viz., by setting the machinery in motion which shall reproduce ideas by virtue of their nexuses, and then choosing from the long train whatever ideas it pleases to employ.

6. Volition manifests itself by a determination of blood to that portion of the cortex of the hemispheres which is concerned in the generation and transmission of any particular idea to the sensorium, thereby determining the extent of the influence exerted by the idea upon the conscious ego.

7. The blood, thus sent in increased quantity to some nerve-center, not only supplies the material from which the nerve-substance receives compensation for the "waste" resulting from activity, making provision for the possibilities of future energy; but also furnishes the oxygen which converts the energy accumulated during the past into force acting in the present.

8. The production and transmission of this will-force are processes resembling in many respects the generation and transmission of an electric current, the discharge taking place, and the circuit being rendered complete, when the tension of the nerve-center has reached a certain intensity. Consequently, as Dr. Ferrier has proved by numerous experiments, electrical stimulation of the cortical centers causes in the voluntary muscles a series of movements which can scarcely be distinguished from movements produced by direct volition.

9. The amount of potential energy thus converted into actual energy, though primarily dependent upon the intensity of the volitional determination, is secondarily dependent upon the amount of scarlet-colored blood at the time in the nerve-center, that is, it is dependent upon the amount of oxygen present at the given moment; which,

in turn, is conditioned upon the general vigor of the constitution, will-power being consequently more potent at some periods than at others.

10. A diminution in the amount of blood sent to the nerve-center at any given moment, though not necessarily diminishing the inherent force of the volitional determination, does diminish the power of executing the will's commands. One may will to do what he is at present unable to accomplish, because the organism, perhaps owing to feeble volitions in the past, has not grown to the power of executing all volitional determinations; but, as the physical organism gradually prepares itself to do what it is repeatedly called upon to do and vigorously endeavors to do, the time may come when commands of the will at present beyond the power of execution may be readily executed. To him who wisely uses the power he has, more will be given.

It follows, it is believed, that man may be held responsible both for the opinions he entertains, and for the course of conduct he pursues. Being a free agent, and being justly accountable for what he *is* as well as for what he *does*, he is accountable to a Higher Power for all his acts, even for those which at the time they were performed he could not have rendered essentially different. He is not as innocent in reference to his beliefs as he is in reference to the size of the pupil in his eye, though he can even increase or diminish the size of this by a volitional determination to remain in darkness or in the full glare of noon-day. He is not as guiltless in reference to his conduct as he is in reference to the twitchings of his stomach, though even these may be determined in measure by the kind of food he feeds upon. He is in possession of a faculty, a self-determining will, which, though at any given time incompetent, it may be, to withhold

assent from propositions which are as false as they are pernicious, and though equally incompetent to restrain its possessor from the commission of deeds that are as detrimental to the interests of society as they are to his own well-being, is nevertheless competent to the production of an organism which will enable him to choose truth in preference to error and virtue in preference to crime.

Responsibility for beliefs:—What one shall accept in the present as an opinion meriting an intellectual assent is dependent upon three conditions, for each of which he may be justly held responsible. These conditions are: (1) The opinions already accepted as beliefs, for if the proffered proposition is clearly inconsistent with these, it is likely to be instantaneously rejected, the rejecter being, however, strictly responsible for the presence in his mind of those imperious occupants who summarily eject their foes. (2) The disposition or indisposition to heed those arguments which may prepare a receptacle for a proposition which, on first presentation, ran violently against existing prejudices; but which may come to receive a cordial welcome, and even the approval of conscience in ejecting some opinions which were never worthy a place in the intellectual temple sacred to truth—for which disposition one is clearly responsible. (3) The exercise of will-power in fixing attention upon reasons and motives, which, being thereby augmented or diminished in cogency, are capable of determining with almost unerring certainty what conclusion shall be reached and what course of conduct shall be decided upon—most persons being capable of believing what they have resolved to believe, and of deciding to do what they wish to do.

This indirect method of securing a coveted conclusion, powerful as it is when one is weighing the arguments of

an antagonist, is still more potent when he is engaged in balancing the pros and cons which are products of his own reasoning faculties; for he is less likely to be called to an account for ignoring or insulting his own children than for belittling the children of others, even as he feels more pride in magnifying the boy who calls him father than in magnifying another's son. Consequently, the process of reasoning which we carry on within our own minds, with a view of deciding what we shall believe, is more likely to result in error than are those processes which have to defend themselves before the tribunal of another's reason.

Responsibility for conduct:—Without entering upon a discussion whether or not acts are invariably a result of the preponderance of motives, it may suffice to present evidence of man's accountability for the power exerted over him by the several motives which ordinarily impel to overt acts. If success crowns this endeavor, the argument in favor of human liberty will be in no way weakened by the concession that at a given time and under prevailing motives, the individual could not have acted differently; nor will this temporary necessity rob him of merit in reference to deserving conduct, nor relieve him from censure in regard to sinful practices. What he *is*, as well as what he *does*, has merit or demerit. Since what he *is*, is a consequent of what he *was*; and what he *was*, was in large measure a resultant of antecedent volitional determinations, present ability is not the measure of present responsibility; nor are present acts meritless because, as a result of past acts of self-denial, he grew to a condition in which the will from inward necessity impelled to the pursuit of right courses.

Of the motives which influence human conduct the

following are the most potent, in each of which, as may be seen, the will has a self-determining power.

1. *Habits*.—These, it is conceded, almost invariably impel to similar acts under similar circumstances. They furnish a motive which the will can scarcely master—possibly is powerless to conquer. The habit of doing what is regarded as right may become so powerful as to be nearly unconquerable. The habit of indulging a particular appetite, however degrading it may be, engenders a motive which perhaps only an iron will can ignore. Be it so. It was not always thus, however. Who is responsible for this altered condition? By permission, or by direct determination, the will has been instrumental in creating this imperious tyrant. Even if you assume that the individual is now utterly powerless, you may not legitimately assert that he is irresponsible—unless it be that species of irresponsibility for which one is responsible, an inability to do otherwise than wrong in the present because he has persisted in doing wrong in the past.

But we are confronted with the assertion, Habits may be inherited from ancestors; and certainly for the motives thence arising one cannot be held responsible. True, habits may be transmitted. True, one may be powerfully disposed to yield to these inherited tendencies. It has not been proved, however, that they are so potent, if resisted with the full power of the will from early life, as to render their possessor helpless. The powerful tendency in the human organism to grow to the acts performed, and not to the impulses which either find no expression or an expression in defiance of will-power actively exerted, renders it possible to form an antagonistic habit which can eventually master an impulse, especially if, as is possible, an ideational state is produced and a deliberate judgment is formed which generates a powerful

counter motive, conscience, meanwhile, rendering efficient assistance, and the will exerting itself, not only directly but also indirectly, by calling attention to the consequences of the proposed course of conduct.

2. *Emotions*:—These, arising automatically, may impel to acts which give promise of present gratification, or may restrain from acts which, it is feared, may be followed by pain. But as already seen, the will has the power of determining which of many existing motives shall be allowed to have dominance. Consequently, responsibility does not cease; and when to this power of determining which motives shall be permitted to have the ascendancy, the further power is added—unquestionably possessed by the will—of calling up new and powerful motives through the medium of ideational states, it becomes evident that automatic emotions do not destroy responsibility.

3. *A Sense of duty*:—Conscience, it is true, is to a large extent a manufactured article, being at any given time a resultant of the fallible judgments formed on all moral questions, many of which judgments are incessantly changing, and many of which questions are continually presenting themselves under new aspects. Consequently, even the motive which presents itself from an imperative sense of duty can neither rob one of merit for doing right, nor exonerate him from censure for doing wrong. A correct judgment in reference to what is proper in any given set of circumstances surely does not render goodness unworthy of commendation; nor does the conviction that wrong is right leave crime as deserving as virtue. Even admitting that conscience at any given time is the spontaneous result of all the moral judgments previously formed, or at present potent, it does not follow that one is irresponsible for its decisions. Irresponsibility in the

present would imply complete irresponsibility in reference to the moral judgments formed in the past, as well as in reference to those formed in the present, and to the relative importance assigned to each—in each of which class of acts we are conscious of freedom. All men believe that of judgments formed in the past one or more might have been different—quite probably believe they should have been, which implies that they could have been. Of the judgments now formed, they admit that many are founded on uncertain data, and are liable to be reversed any moment, which they deem themselves capable of doing and indeed likely to do. They also feel themselves competent, by the exercise of the will, of intensifying the impression made by one judgment over that made by another, even though the intrinsic merit of the two may be apparently equal. By fixing the attention upon one, to the neglect of another, it may be made to assume an importance out of all proportion to its real cogency.

Thus, whatever may be the product of the automatic machinery—if it is automatic—which furnishes decisions on moral questions, for that product man may be justly held responsible. If it is a fabric from a self-acting machine, it is from a machine constructed under the effective or permissive decrees of an unfettered will.

4. *Motives arising out of religious beliefs:*—As men are responsible for their religious beliefs, even though at the present these may be a legitimate outgrowth of opinions previously acquired, so also are they responsible for the motives thence arising.

Every person's conduct is determined in measure by his conception of Deity; and every person's conception of Deity is the product of his own self-determined thought. No two worship the same God. Each has a conception

of his own, though he may designate it by the same term.

Men's conduct is determined in part by their hopes; but the foundation of these is laid in each person's volitional acts.

Again: our acts are influenced by our fears, which are products of the relation between our intellectual beliefs and our volitional determinations.

Conduct is determined, not infrequently, by the regard we have to the happiness of others; and this is determined by the views we entertain and by the measure of disinterestedness we have tutored ourselves to practice.

The will may be regarded as possessing the following powers:—

1. The power of initiating activities, both muscular and mental.

2. The power, after an activity is initiated, of continuing it without the conscious knowledge of the ego.

3. The power, when no motives are present to the mind, at least when none are consciously present, of acting in accordance with fixed principles, which have been pronounced worthy of determining the conduct; of the influence of which principles the mind may be, for the time being, entirely unconscious.

4. The power, in the presence of motives inviting to the abandonment of fixed principles, of calling up new motives and of selecting and intensifying those which the judgment declares most weighty; thus, by magnifying some and minifying others, the will is capable, by the simple control of attention, of giving color to the conclusion reached and of deciding the course of conduct to be pursued.

5. The power, in most cases—presumably in all cases, if will-power were duly cultivated—of restraining its

possessor from any overt acts till an opportunity has been allowed for further consideration, during which period of suspended action the will may augment or diminish the force of motives which either impel to, or deter from, the commission of the contemplated act. This demand for "a stay of proceedings," formed originally upon a deliberate conviction that hasty action under unreasoning impulses is liable to prove unwise, becomes, by being frequently made, a confirmed habit, which in many instances greatly aids in ascertaining which way duty lies.

6. The power of confronting its possessor with the probable consequences of his act—consequences near and remote.

7. The power of impressing its possessor with a keen remembrance of the injurious results of acts performed under impulses unsanctioned by judgment.

8. The power of forcing its possessor to note his weaknesses, as well as the parts of his character which are strongly defended.

9. The power of intensifying the verdict of the moral sense, to the effect that the deliberate decisions of the will have been too often disregarded in the past, and should be obeyed henceforth.

10. The power of giving to certain feelings such a measure of intensity as shall render obedience to volitional decisions much easier.

Consequently, in a properly constituted human being, in good physical and mental condition, every activity is measurably under the control of the will, either directly or indirectly, at least every activity that is concerned, to any controlling extent, in his moral well-being, even the automatic machinery being so far subject to his control as to leave him responsible for the beliefs he entertains and for the course of conduct he pursues.

CHAPTER XXIV.

SCIENCE AND THE BIBLE; NO CONFLICT.

To deem it possible that there may be a lack of harmony between an accurate knowledge of natural laws and a correct interpretation of a supernatural revelation is to assume that there may be more than one originating cause in the universe, or that the First Cause is chargeable with duplicity of purpose, if indeed He may not be guilty of designing to deceive His intelligent creatures. Reason affirms that more than one originating cause is inconceivable. In this opinion physicists and metaphysicians concur. Nor is human reason less emphatic in asserting that unity of design must characterize the works of nature, whatever may have been their origin; and must be a characteristic of the First Cause of all things, if a First Cause exists. Conflicting purposes imply imperfection. They must arise from lack of knowledge, or from feebleness of will; neither of which is conceivable in an Unconditioned Personality, to which, as a Primal Cause, reason is forced to refer all existences. And to imagine that the Ultimate of all ultimates could possibly design to deceive His intelligent creatures is to imagine that He could be less than the sum of all goodness—that the stream can rise higher than the fountain. Accordingly, he who has faith in a divine revelation (the existence of which is highly probable, if we conceive of God as having regard to the well-being of sentient

creatures) need have no apprehensions in reference to the progress of science. Scientific investigation cannot possibly obscure the light of revelation. Only philosophy falsely so called can produce this result, and its effects must be temporary in their nature. Theology has a province of its own, and a right to exact obedience to its laws. A supernatural revelation is not amenable to the laws of physics.

Nor is the scientist called upon to assume a hostile attitude towards the teachings of Scripture. These, properly interpreted, can by no possibility retard the progress of physical science. The student of nature may fear, and has cause to fear, that a false exegesis of Scripture may antagonize the established facts of science, though the effects of such antagonism must be transitory. Certainly he has no cause to apprehend any disastrous results from just interpretations of a divine revelation. As long as the scientist is left free to explain everything that is graven on the accessible leaves of nature's great volume, he may safely accord to the theologian the liberty of explaining that which is contained in a written revelation. Why should either presume to invade the province of the other? Neither province is so restricted as to leave its citizens without broad fields awaiting more successful cultivation.

It is safe, therefore, to affirm that the two volumes, Nature and the Bible, must be in perfect harmony. Being expressions of the same will, no conflict is possible. Accordingly, when the interpretations given to either are in seeming antagonism with the teachings of the other, it is reasonable to conclude that either the theologian or the scientist is misreading the volume committed to his care. Nor is it possible to deny that each has frequently fallen into serious errors. Scientists have; and they

frankly admit it. Theologians have; and it would be folly for them to deny it. Whilst there may, perhaps, be some measure of impropriety in enumerating the mistaken inferences of scientists, there is nothing unbecoming in acknowledging that theologians have been indiscreet in hastily—often dogmatically—opposing the conclusions reached by scientific investigation. Unnecessary antagonism has been produced. In some instances it has become but too plainly evident that they who have undertaken a defence of Scripture are but poorly qualified for the task, seriously weakening a cause which they hoped to strengthen. Ardor is well: argument is better. Religious faith is grand: logical force must conquer the field ere faith can erect her majestic spire. Reasoning steeped in prejudice has no weight with the unbiased. It is a misfortune when, as has frequently happened, defenders of Scripture are compelled to accept conclusions which they once pronounced glaringly atheistic. It proves but too conclusively that they were under the guidance of strong prejudice. Such was the case with those theologians who regarded the doctrine of the earth's revolution upon its axis as inconsistent with the declarations of Scripture, and certainly heretical; with those who viewed the theory of gravitation as decidedly atheistic in its tendencies, and Newton as giving comfort to the enemies of Scripture; with those who, ere a new interpretation of the first chapter of Genesis was forced upon the church, persisted in pronouncing the teachings of geology antagonistic to the Bible.

Mr. Spencer has well said, "Just as though unaware that its central position was impregnable, religion has obstinately held every outpost long after it was obviously indefensible." "Obliged to abandon one by one the superstitions it once tenaciously held, and daily finding its

cherished beliefs more and more shaken, religion shows a secret fear that all things may some day be explained; and thus itself betrays a lurking doubt whether that Incomprehensible Cause of which it is conscious, is really incomprehensible." *

There is reason to fear that this folly may repeat itself. Some there are, who seem to imagine that unless the antiquity of man can be compressed within the limits of Archbishop Usher's chronology, supernatural revelation is seriously imperiled; though, to prove that there is a scientific chronology in Scripture prior to the founding of Solomon's temple would require more learning than this age can command, and to retain faith in the unity of the human family while refusing to lengthen the period of human history is daily becoming more difficult—in the opinion of many is now an impossibility, more time being imperatively demanded for the production of differences which exist between the several races of men. Nor is it politic to ignore the fact, that though some are violently opposed to the doctrine of the transmutation of species—deeming it absolutely impossible that all organisms should have developed from a few parental forms, possibly from a single primordial germ,—it is illogical to characterize the theory as atheistic, since it is impossible to see why it should be regarded as a less noble conception of God to believe that he may have created one or two germs capable of evolving all living existences, than to believe that he created each species independently. If he chose to produce all plant-forms and all animal organisms by evolution from one primordial germ, assuredly no one is at liberty to consider His existence less real, His personality less marked, His will less powerful, His wisdom less perfect, His self-sufficiency

* *First Principles*, p. 101.

less complete, His nature less unconditioned. It is possible that theistic evolution may be regarded by the great mass of thinkers, in subsequent generations, as a nobler conception of God than that which prevails in the present day. If it succeeds, as it may, in commanding itself to the unbiased human intellect, theology will be in no way hampered. If religion has merited the censure passed upon it by Mr. Spencer, of having ignored her immense debt to science, it is to be hoped that in future she may frankly acknowledge the extent of her indebtedness; on the other hand, if, as some theologians are disposed to assert, science has somewhat irreverently handled the sacred ark of the eternal covenant, it is to be hoped that she will henceforth walk softly as she approaches the presence-chamber of the Unfathomable. Whilst expressing the fervent desire that the latter may be delivered from the impenetrable darkness which must result from the belief that man can know absolutely nothing in reference to the nature of the Ultimate Reality, it is honorable also to desire, with equal fervency, that the former may manifest becoming humility, as the attempt is made to determine the incommunicable attributes of that Infinite Personality whose power is manifested in every form of existence, from the grain of sand to the most intellectual of earth's honored sons.

Faith may be strengthened by examining the more important harmonies which exist between science and revelation, harmonies which no reasoning can effectually destroy.

I. THE DIVINE WILL IS THE ORIGINATING CAUSE OF ALL THINGS.

This is unquestionably the Biblical conception of God. He is infinite. He is omnipotent. He is omniscient. He is benevolent. These attributes have their unity in

His Unconditioned Personality. Man cannot understand the Unconditioned. He is forced to content himself with regarding the Divine Will as a law to itself. Back of everything there is, must be, an Infinite Personality. Infinity and personality are indeed to us irreconcilable terms. We are compelled by reason to regard God as Infinite. We are under the necessity of viewing Him as a person. As our natures are finite, we cannot expect to circumscribe the Illimitable, to measure the Immeasurable, to comprehend the Incomprehensible.

With such conceptions of the Creator, the reader is prepared to accept the Scriptural statement: "In the beginning God created the heavens and the earth"—everything objective to Himself. "God said, let there be light"—by an act of will He called it into being. These volitions were not determined by outward conditions, nor by inherent necessity. Matter, space, time, number, were not pre-existing entities, independent of God and capable of determining the nature of the creative volition. "All things were made by Him." "By Him were all things created, that are in heaven, and that are in earth, visible and invisible, whether they be thrones, or dominions, or principalities, or powers; all things were created by Him and for Him; and He is before all things, and by Him all things consist." *

Is science prepared to accept this?

The weight of scientific testimony favors the theory that matter owes its existence to the Unconditioned Will of God. Science claims to have proved that matter cannot be self-created. It cannot be the really efficient agent in the production of any change, either in itself or in anything external to itself. It is a condition of the action of force, the recipient of impulse. Force is not one

* Col. i. 16.

of its properties. This is proved by the fact of inertia. To affirm that force is an attribute of matter, and in the same breath to declare that matter is inert, is self-contradictory. It implies that passivity and activity can be properties of the same substance. Moreover, that force is not entitled to be regarded as an attribute of matter appears from the fact that it cannot be recognized as a direct effect of matter, as other properties can. The belief that it may be, is a deduction of reason. Certainly, it is not a property of matter in the sense in which hardness, extension, impenetrability, are. Nor, so far as we can see, can it originate motion by virtue of its being an attribute.

Motion, an exponent of force, is a change in position; and matter cannot even tend to its origination. It consists merely of ultimate molecules capable of being influenced by force. In the various forms of motion, force is intercepted by matter and its presence thereby manifested. Material movement can be efficient in originating nothing but material movement. If force is an attribute of matter, then sensation, it would seem, might also be an attribute of matter; but sensation is essentially different from molecular vibrations, from anything which matter can generate. The effect is totally unlike the cause; and the cause is seemingly no cause whatever. The vibrations come to a stop, and something different takes their place. To assume that consciousness is a phenomenon of agitated molecules in the brain involves a world of absurdity. It requires us to regard consciousness as an affection of matter, and thought as a material entity or as one of the essential attributes of matter. It supposes that the movement of molecules—or of an atom, if consciousness is to be regarded as concentrated in a single atom—may be the efficient agent in producing the sense of personal iden-

tity, though no molecules and no atoms tarry in the human system more than a few years at longest, probably not longer than one year. It assumes that memory is an atom, or a combination of atoms, stored away in the cranium, and that atoms which are successors to departed atoms are capable of reproducing facts treasured from the past, and even of informing us that ideas have been lost, though incapable, meanwhile, of reproducing the lost treasures or testifying clearly to their nature.

Matter, it is conceded, is not self-created; nor is force one of its attributes.

Nor is it possible to regard matter as a property of self-existent force. There are physicists, it is true, who insist that the universe is explicable on the hypothesis of ultimate centers of energy. They do not regard matter as a substantive entity, but as a phenomenon of force. Substances, they believe, are known by their essential attributes, and can be known in no other way. They deny that matter possesses any essential attributes. Even extension, resistance, inertia, and impenetrability, they designate phenomena of force. Light, heat, electricity, magnetism, and chemical affinity—which they denominate modes of motion—are in their judgment no more certainly transformations of one ubiquitous force than are the various forms of matter. All finite existences may be reduced to modes of motion. These various modes of motion are only phenomenal manifestations of an eternal underlying reality. Matter, in its ultimate essence, is spiritual, and needed no creator. Every grain of sand is but the pulsation of an eternal life; hence the mysterious influence which nature has over us.

According to this theory, matter is only a function of force, and can be described only in terms of force. The entire universe is but the visible manifestation of an

invisible force. It is phenomenal. In the opinion of J. Allinson Picton, this is the theory into which the christian system of doctrine is to be merged ere long. Christian pantheism is to take the place of theism.

At present, however, the majority of scientists regard matter as an entity, not as a mere phenomenon; as a reality, not as an aggregation of physical forces; as a substance, not as a simple property of some underlying reality; as demanding a creator, not as the mere shadow of some unseen entity. It is apparently safe to regard this as the testimony of scientists inasmuch as the warfare still continues between those who regard force as an attribute of matter and those who regard matter as an attribute of force. The materialists may be allowed to refute the spiritualists, and the spiritualists to refute the materialists. The truth, as often happens, may be on neither side. Certainly, it has not been clearly proved that force is simply an affection of matter: nor that the latter is an attribute of the former. Each may be a reality. Consequently, while one class is asserting that there is no mental force distinct from the brain, and another that the brain itself is in its essence spiritual, the theist is strongly tempted to conclude that each has succeeded in refuting his antagonist, and that matter and force are alike in each possessing an actual existence independent of the other and in demanding an adequate cause.

As has been said by Mr. Spencer, "The indestructibility of matter is now held by many to be a truth of which the negation is inconceivable." This belief, as it would seem, ought to carry with it the conviction that matter is not merely "a localized manifestation of force," a phenomenon. It seems somewhat unphilosophical to say that phenomena are indestructible. If, then, matter is indestructible, ought it not to be regarded as a reality and

not as phenomenal? Those who are unwilling to view it in this light ought, it would seem, to cease talking about the indestructibility of matter, or ought frankly to concede that they simply mean the indestructibility of force. This, manifestly, is all they can mean. They do not design to assert that a "localized manifestation" is indestructible. Evidently, only the force is indestructible. But what are we to understand by the term force, as employed by these writers? Why, evidently we are to understand the only underlying reality, the Ultimate of all ultimates. It would seem, therefore, that though we have heard so much in these recent years about the indestructibility of matter, the continuity of motion, and the persistence of force, the only indestructible, continuous, and persistent reality, after all, is the Unknowable.

Science lays claim to having proved that matter cannot have existed from eternity. It teaches that material things must have had a beginning, inasmuch as everything material has the characteristics of a manufactured article, forcing the conviction that it must have had a beginning. "No theory of evolution can be formed to account for the similarity of molecules, for evolution necessarily implies continuous change, and the molecule is incapable of growth or decay, of generation or destruction. None of the processes of nature, since the time when nature began, have produced the slightest difference in the properties of any molecule. We are therefore unable to ascribe either the existence of the molecules or the identity of their properties to the operation of any of the causes which we call natural."*

2. As science is indisposed to undertake the task of showing that matter is the Ultimate Reality, does it con-

* Prof. J. Clerk Maxwell, F. R. S., *Nature*, vol. viii. p. 441.

sider itself competent to prove that physical force is the originating cause of all things? No: it teaches that force cannot generate itself. It is not self-existent, an eternal, independent entity. The results of scientific investigation make it clear that the processes of nature must have had a beginning; and as well also the forces operative in those processes. The complicated machine which is constructed for the transmission and distribution of energy could not have existed from eternity; nor could the forces which are transmitted. They exist in correlation with material existences, under conditions and in dependence. The convertibility of the several forces is an established fact, it is true; and it is probable that they may yet be successfully reduced to one force, as some claim has been done already. Dr. Cohn, of the University of Breslau, affirms: "Electricity and magnetism, heat and light, muscular energy and chemical action, motion and mechanical work are only different forms of one and the same power."* If this be true, what follows? Evidently not that the force operative in the world is an eternal, independent entity, self-existent. Even Mr. Hebert Spencer concedes that force is to be regarded as an expression of will. Modern research is apparently forcing upon us the conviction that all force, in the ultimate analysis, is an outflow of an Infinite Will. Dr. Carpenter says, "The deep-seated instincts of humanity and the profoundest researches of philosophy alike point to mind as the only source of power." Again: "Believing that all force which does not emanate from the will of created sentient beings, directly and immediately proceeds from the Will of the Omnipotent and Omnipresent Creator, . . . I do not feel the validity of the objections urged against

* Prof. J. Clerk Maxwell, F. R. S., *Nature*, vol. vii, p. 137.

the idea of the absolute metamorphosis and conversion of forces."*

Mr. Spencer says, "Force, as we know it, can be regarded only as a certain conditioned effect of the Unconditioned Cause—as the relative reality indicating to us an Absolute Reality by which it is immediately produced."†

Force, then, in its origin and in its continuance, is dependent upon the will in which it originates. The power it wields is delegated. Will-force is the only force in existence. The will of God is the only self-existent force in the universe: motion, a result, must have its origin in volition. No force—and no motion—possesses the power of self-origination. Neither can be eternal, except in the sense in which a volition may be regarded as eternal because its source is. Every force may be transmitted and transmuted, but its origin is the will of the creature, or is the will of the Creator—all force being traceable backwards to the Unconditioned Will of God. These are the conclusions towards which modern science points with unmistakable clearness.

The physical forces are to be regarded, then, as an expression of the Divine Will. They are streams of potency issuing from the self-existent source of all power.

3. In like manner, life also must have had its origin in the Will of God. The famous maxim, "omne vivum ex vivo," is accepted with as much confidence as the law of gravitation. Science repudiates the assumption that life may have originated in spontaneous generation. No combination of material elements, or of physical forces, could have given birth to life. Until it has been proved that living organisms have existed, or at least may have

* *Mutual Relation of the Vital and Physical Forces*, p. 730.

† *First Principles*, p. 170.

existed from eternity, it will be regarded as in harmony with science to affirm that every animate existence owes its origin to a Divine volition. That life on earth has not been eternal is conceded. There was a time when the conditions of life did not prevail on this planet. That a living organism, or living organisms, were transported from some other sphere is a mere conjecture, and improbable. The weight of scientific evidence is decidedly in favor of the Biblical doctrine,—Life a Divine creation.

With a strong presumption in favor of the Mosaic account, it becomes easier to understand the word "bara," which is used with discrimination in the first chapter of Genesis, as meaning absolute creation in connection with the origination of matter, of plant-life, of animal organisms and of man.

The will of God, then, may be regarded as the originating cause of all things,—of matter, of force, of life, of mentality. The word cause is not to be understood, in this connection, as a synonym for antecedent, but as that which has efficiency in producing effects. In strictness of speech, there are no secondary causes, each secondary cause being an effect of an antecedent cause, which in turn is an effect—the chain running backwards to the primal cause of all so-called causes, the Unconditioned Will of God. A mere antecedent is no cause whatever; and what are known as secondary causes, having only a delegated efficiency, and being effects, are not causes in the sense of having originating power. To prove with scientific accuracy that this extended series of effects,—each of which has no more than a delegated efficiency,—flows from the Divine efficiency, is the problem awaiting a clearer solution—one upon which science is laboring unceasingly.

The theory here outlined is not open to the charge of

being a subtle form of pantheism. To say that God is immanent in nature is not to identify Him with nature. Divine immanency is not inconsistent with Divine transcendency. God is above nature as well as in nature. To view God as no more than the life of the universe is hylozoism. To regard all existences, the material and the immaterial, as only visible manifestations of an eternal, self-existent substance, which has no existence independent of, over and above nature, and by consequence is not cognizant of its own existence, being without personality, is panthesim. To combine two conceptions, the immanency and the transcendency, regarding God as voluntarily immanent in nature and at the same time infinitely superior to nature, having intelligence, will and separate subsistence—is what we understand as Christian theism.

Consequently, as is now generally conceded, science finds no serious difficulty in accepting the Mosaic account of creation,—not man's mistaken expositions thereof, but the account as self-interpreted. What obstacle prevents the scientist from accepting the first verse of Genesis, which announces that matter owes its origin to the Divine Will? In crediting this, he is perhaps not precluded from believing that God fashioned matter from his own eternal substance, provided he does not insist on regarding it as an unwilled evolution. So long as the scientific expositor has permission to interpret the language as seems to him least repugnant to reason, has he any right to complain if some divines prefer to interpret the verse as ascribing absolute creation to God? Because he insists that the creation of something from nothing is to him inconceivable, has he a right to affirm that to the theologian it must also be inconceivable that a universe should have its origin in an omnipotent Will?

Is he able to measure Omnipotence? In either case—whether matter was formed from God's own eternal substance, or was called into being from nothingness by the almighty fiat of an Infinite Will, thereby increasing the sum of existence in the universe—its origin may be the result of a Divine volition. In this statement, both the scientist and the theologian may concur; and such concurrence is general.

Is there any insuperable difficulty in believing that "The Lord God made every plant of the field before it was in the earth, and every herb of the field before it grew"? The scientist cannot tell us how plant-life originated. He cannot account for its origin by any known secondary causes. Until he can give a more satisfactory answer, why should he object to this, which characterizes plant-life as a principle distinct from matter?

Is there any valid reason why the student of nature should object to the statement that "God created every living creature after its kind"? It has not been proved that animal organisms evolved, or can evolve, from either plants or inorganic matter. It has not been rendered probable that abiogenesis has occurred even once, or possibly might occur. Until a more rational hypothesis is presented, why object to accepting the Scriptural assertion? Until a more satisfactory solution of the intricate problem is furnished, it is unwise to ridicule the solution which is accepted by a large number of eminent thinkers.

Are there insurmountable barriers to our believing that "God created man in his own image"? Even admitting that evolution has been proved to have occurred in each great system—in matter, in plant-life, in animal organisms, in the human race,—admitting that fixity of species is an exploded theory, still, scientists have not proved that one of these four great systems has passed

into another by insensible gradations. They have not proved that man evolved from the lower animals, that irrationality can originate rationality. Until this is proved, nothing is proved as against the Scriptural assertion that "God created man"; and even when it shall have been proved that man was evolved from the monkey-tribe, it will be incumbent on those who desire to eliminate God from the universe to prove, not merely that "bara" means *forms* and that evolution is not God's method of working, but that the non-sentient can give birth to the sentient.

The Mosaic cosmogony makes mention of four originations:—

1. That of matter. Gen. i. 1.
2. That of plant-life. Gen. ii. 4-5.
3. That of animal life. Gen. i. 21.
4. That of man. Gen. i. 27.

Evolution has these four extended territories in which to display its powers; and before laying claim to a wider field, it ought to present evidence of having cultivated its possessions up to these seemingly impassable border-lines; then, title in hand, it will appear less presumptuous in claiming the prerogatives of a Creator.

II. THERE HAS BEEN DEVELOPMENT.

This affirmation is accepted alike by the scientist and by the theologian. Neither has the right to regard himself as the sole champion of the theory. Certainly the expounders of the Scriptures are indisposed to lay claim to this honor, though they are prepared to defend the doctrine,—not, however, the atheistic forms which it too frequently assumes. They do not believe that molecules of matter, and atoms of force, and germs of plant-life, and parental forms of animal organisms, and ancestral types of the human family, were developed from

pre-existing lower forms. They are indisposed to accept the doctrine of the transmutation of species; and consequently, when it comes to the question of regarding all existences as an ascending series of individuals,—even genera being obliterated,—they are disposed to enter their protest; and when they are asked to regard the above four kingdoms as issuing by insensible gradations from pre-existing “star-dust,” their reason cries, “Halt !”

To deny, however, that there has been a purpose, and that this purpose has been gradually unfolded, producing a connected series of events; that the consecutive links in this series indicate improvement; that there is unity in all the stages of this complicated system of related changes,—would be even more unreasonable than to assert that the universe came into being by a single fiat of the Almighty. Creation has had a history. There has been a plan which was gradually unfolded. There has been progress. God *is*, not merely *was* for one brief instant. Believing that there have been changes in the past,—creative eras,—one readily comes to believe that there will be changes in the future. That the condition of things in the present is different from what it was “in the beginning” is no more certain than that the present condition of things will not continue forever. Organizations exist now which were not in existence during paleontological periods—on earth at least. Those in existence now, should God so choose, may be succeeded by others, or everything may be annihilated, or, may be so changed as to be a new order of things. God’s purpose will no doubt be consummated. Hence it may be safely conceded:—

1. That there is a single purpose running through the history of the earth. Teleology is the highest law in the universe.

2. That God, in the manifestation of His purpose, has seen fit to furnish His rational intelligences with a gradual manifestation of His omnipotent power. He might have willed otherwise. He has chosen to unfold His plans in successive stages, perhaps because this course is most conducive to the good of His creatures, enabling them to comprehend more clearly His nature, His manifestations, and His benevolent designs.

3. That the successive stages in the manifestation of this one purpose are closely related. Except at certain great breaks, there is continuity; and even the breaks succeed each other in an ascending series, pointing to a predetermined end,—an improved condition. Originations are a progressive disclosure of an established order, being from the less complex to the more complex—matter, plant-life, animal life, rational life. Each new development, and each new display of creative energy, is a revelation of laws in an ever-ascending series.

4. That, consequently, improvement characterizes the succession of changes. Retrogression occurs, it is true; but this is confined within comparatively narrow limits. In the aggregate, the changes indicate advance. There is an order of thought. Progress is the law of the universe.

5. That, by virtue of this unity in design, there is unity in the result. Notwithstanding the numberless stages of development, and variety in the related parts, there is harmony. The universe is a cosmos.

6. That organisms exist now which were unknown on the earth in primeval eras. For all that can be proved to the contrary, physical forces, *i. e.*, differentiated modes of motion, may be in operation now which were not in operation when God alone was. New organisms may be created. New forces may be set in motion. The world

may perish through age, or may pass through changes rendering it as much unlike its present self, as its present state is unlike its pre-existing state.

It would seem that science may accept the Mosaic cosmogony. That ancient document asserts:—

1. That in its primitive condition matter was void, empty, deep, dark—a vast, inert, gaseous mass, brooded over by the power of the Infinite (Gen. i. 1-2). Prof. A. Guyot, in his work entitled *Creation*, has given valid reasons, it is believed, why the word translated in our version “earth” should be regarded as equivalent to matter in general. In like manner, the term “water,” employed in verse second, may be taken as designating the state of the cosmic elements. The Hebrew word denotes a tumultuous, undulatory movement. Hence, without conceding that the word is a subterfuge forced upon theologians by the progress of science, we conclude that the matter, which verse 1 affirms that God created, was gaseous; “void,” because homogeneous; “dark,” because inactive; “deep,” because expanded through a great extent of space; brooded over by the Spirit of God, because He alone could impart to it the forces subsequently associated with it. Certainly force has not been proved to be an essential attribute of matter. Why, then, may not the theologian and the scientist agree in regarding this “formless, homogeneous, structureless” original element as the substance from which worlds were formed?

2. That this Spirit, brooding over the face of the abyss, was the efficient cause of activity, resulting in the production of light, *i. e.*, of all the physical forces, each of which is capable of conversion into light. Hence, as might be expected, the creation of light antedated the creation of the sun. The theologian may find the Bible

fitted to aid him in accepting the results of scientific investigation. The scientist may discover, in the undulatory theory of light and in the correlation of the forces, an argument in support of revelation. Neither can detect any serious want of harmony between nature and the Bible. The natural and the supernatural must harmonize.

Of course, no theologian now interprets the term "day" (*yom*), as employed in the account of creation, as meaning a period of twenty-four hours. We have the authority of Scripture for regarding the word as frequently equivalent to a period of indefinite length. "Your father Abraham desired to see my day." "The day of the Son of Man." "I must work the work of Him that sent me while it is day." "If thou hadst known, even thou, at least in this thy day." "The day of salvation." "The day of judgment."

3. That there were divisions in the nebulous matter which, under the influence of centrifugal and centripetal forces, broke into numerous gaseous masses; and that these differentiated into systems; these, into worlds. "God divided the light from the darkness," *i. e.*, the active nebulae from the inactive matter that pervaded space. "And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters." An expanse, void space, was made to intervene between the nebulous masses, each of which was concentrating, forming worlds. Planetary systems are separated. The heavens are organized. Motion is producing division; and in each great division, bodies of various sizes are forming. The nebular hypothesis, if established by scientific argument, meets no serious difficulty in the Mosaic cosmogony.

4. That a portion of matter condensed into a solid

globe, the earth; that its waters, which primarily constituted a shoreless ocean, were subsequently "gathered together unto one place," causing the dry land to appear. In verse 9, Moses gives the result, not the lengthy process. If science can make good the following statements:—this condensation was a result of the loss of heat by radiation; the waters, originally warm, must also have been acidulated, inasmuch as the material deposited in rocks was once in gaseous state; by chemical action the earth was transmuted into a vast galvanic battery, constantly throwing off streams of electricity which at the limits of the enveloping atmosphere became luminous, rendering the earth a brilliant star; the earth lost its luminosity by cooling, and became at length a dark speck on the ocean of immensity; in the process of cooling, it shrank to such an extent as to cause depressions and upheavals, resulting in the separation of land and water;—the Bible offers no objection. Neither the theologian nor the physicist needs to grow nervous. Each may address himself to the task of ascertaining the facts.

5. That the earth brought forth vegetation. Verse 11, of chapter i., can scarcely be understood as intimating that a combination of physical forces, or of material elements, produced plant-life; for, in chapter ii., verses 4-5, we read, "These are the generations of the heavens and of the earth . . . in the day that the Lord God made . . . every plant of the field before it was in the earth, and every herb of the field before it grew."

6. That the sun and the moon became the source of light and heat to the earth. Not that these were then first created. They may have existed before, being then simply made to assume new and more important relations to the terrestrial globe. The earth being no longer self-luminous, and having lost much of its heat by radia-

tion, received its light, and with light, heat, from the sun.

7. That the waters teemed with living beings, and the air became the home of birds. If science can prove that there was an established order in the introduction of the various species of animals,—protozoans, invertebrates, fishes, reptiles, mammals,—the Bible student has no cause for alarm. His text-book merely affirms that God created animals; and this has not been disproved. Spontaneous generation has very few adherents. Creation of the various animal organisms may have been a series of creative acts: it may have been a creation by derivation.

8. That man was the final act of creation.

Certainly, then, according to the Biblical account, there has been progress. Evolution within each of the four great classes.—matter, plant-life, animal life, rational life,—science is at liberty to prove, without incurring censure from interpreters of Scripture. Has it succeeded in proving that all forms, within these four classes, are evolutions from as many primordial germs? Quite doubtful. Still, theism has no objection to the continuance of the effort; no cause for apprehension if success shall reward the labors. God is not eliminated. The Bible statements are not disproved. These great orders, if not the species included under them, are declared in Scriptures to have been created by Him whom theists denominate the First Cause of all things; and until it is proved that they were successively evolved from pre-existing forms, the chain being run backwards to some one eternally existent substance, science and the Bible cannot be said to be in antagonism. There is no valid reason why it may not be asserted that nature's great volume and the Mosaic account of creation are in perfect harmony.

III. THERE HAVE BEEN BREAKS IN THE ORDINARILY CONTINUOUS FLOW OF EVENTS.

Having attempted to establish this proposition in a preceding chapter, we will not burden the reader with further arguments under this head.

CHAPTER XXV.

SCIENCE AND THE BIBLE: NO CONFLICT (*CONTINUED*).

HAVING seen that science and the Bible are in harmony, in regarding the Unconditioned Will of God as the originating cause of all things, in conceding that there has been development, in being ready to admit that there have been breaks in the ordinarily continuous flow of events, the reader is invited to consider a fourth harmony.

IV. THE PRESENT ARRANGEMENTS OF NATURE, IN WHICH THERE IS AN ORDERLY SUCCESSION OF EVENTS, MUST HAVE HAD A BEGINNING.

It is impossible to believe that there should be an order evincing design, without an antecedent cause to produce it. Phenomena must have an underlying reality. Law presupposes a lawgiver. Order is not an eternal verity which imposes conditions upon all modes of existence. Like time, space, and number, it may be regarded as a necessary result of God's own eternal Personality; but it cannot be regarded as self-existent. That would be to violate the law of unity in the origin of existences. Reason affirms that there can be but one eternal reality, and that, consequently, a predetermined order must be a result of the existence of an eternal Intelligent Will.

More than one infinite—and the First Cause must be infinite—is inconceivable; for two or more infinites, by

limiting each other, would each become finite. In like manner, more than one absolute is unthinkable. To suppose that an order existed independent of the First Cause is to suppose that there could be two first causes, which is manifestly inconceivable, inasmuch as that which necessitates more than one first cause would be "the First Cause." Consequently, to conjecture that order existed antecedent to, or independent of, the First Cause, is to designate it as the First Cause; and as order implies intelligence, will, and separate subsistence, this first cause must have been a Personality. We are under the necessity of regarding the Ultimate of all ultimates as unconditioned.

If it is said that this law of uniformity is a result of the essential properties of matter, and that in consequence of these essential properties the universe has evolved itself in an unbroken continuity, we answer: Until it is proved, as it has not been, that matter may be eternal, it can scarcely be said to be illogical to affirm that the order of nature must have had a beginning. If matter had a beginning, and with it the law of uniformity, then He who created the former must have imparted to it the latter.

The principle of uniformity is not an intuitive belief, but is an induction from experience. Belief in causation is intuitive; but though reason necessitates the belief that under the existing arrangement like causes produce like effects, it does not compel the concession that the causes which are now in operation have always been in operation. Possibly a different arrangement might have been substituted for the present arrangement. Certainly the stability of the present order of things is not a primary belief. This is clearly asserted by John Stuart Mill. He affirms: "The uniformity in the succession of events . . . must be received, not as the law of the uni-

verse, but of that portion only which is within the range of our means of observation, with a reasonable extension to adjacent cases."* What is the earth compared with the universe ! What is human experience compared with the experiences of all intelligent beings ! What is time compared with the stretches of infinite duration ! Because the law of uniformity prevails here and now, are we justified in affirming that it prevails everywhere and through eternal ages ? Assuredly not.

An effect is seen, it may be, to follow for one hundred times from a definite combination of causes. The inference is drawn that it will always do so, provided the same causes, in the same relations and with the same potency, are in unhindered operation. This is evidently an induction. We are not warranted, however, in inferring a universal law from a limited number of instances. An induction of this nature can render a belief eminently probable: it cannot render it absolutely certain. An examination of a large number of cases may render it highly probable that nature's laws are immutable, at least within limits. No examination, however, which man institutes, can force the belief that in every conceivable case, under the existing arrangement even, these laws must remain in such undisputed ascendancy that a supernatural revelation is an impossibility; and, manifestly, no induction is sufficiently extensive to impel belief in the absolute universality and infinite duration of this seeming immutability. If there is such a law as the eternal changelessness of nature's law, rendering miracles an impossibility and the beginning of the present order of things inconceivable, reason ought to be able to recognize it as an intuition. Instead, reason testifies that law presupposes a law-giver, who must have instituted it, and may abrogate it.

* *Logic*, vol. ii. p. 117.

Accordingly, it is the conviction of the human family that the present apparent immutability must have had a beginning and will have an end. This opinion merits respect. Even Herbert Spencer concedes, "We must presume that beliefs which have long existed and have been widely diffused . . . have some foundation and some amount of verity." Consequently, this wide-spread and permanent conviction must have a basis in truth.

To argue, then, that inasmuch as nature has probably been uniform in its operations during the period covered by human observation, therefore the present economy stretches from eternity, is quite evidently illogical. The conclusion is broader than the premises, and in the judgment of many is unwarranted. Experience justifies no such inference; and yet the law of uniformity can discover no other basis, except experience, upon which to rest. Still, experience does not warrant the conclusion that nature's laws are immutable under the existing economy; much less, that this economy is universal and eternal. Because gravitation is a law which prevails over a widely extended domain, it does not follow that it is universal and eternal. Herschel directly says: "It fails beyond the region of the double stars." Be this as it may, no justification is furnished of the affirmation that it operates, precisely as it does on earth, through the measureless fields of immensity. Scientists assert that ether is not affected by the force of gravitation; and that the force of repulsion is as universal as the force of attraction, and seemingly has equal potency. If it is conceded that all the phenomena which present themselves under the existing economy are effects of natural causes, it does not follow that all phenomena in the buried past were effects of natural causes; much less, that they were effects of the same physical causes which are now in oper-

ation. After proving that nature's laws have been unvarying during the period covered by time, it will still remain to prove that the same laws existed and were uniform ere time began. Until it has been proved that nature's laws have been immutable during the flow of time, it cannot be proved that they were unvarying in eternity. In such a proposition, logical proof is an impossibility.

If, then, belief in the unvarying operation of nature's laws is not *a priori* conviction, but rests on experience, are we justified in concluding that the present order of things—under which the same cause invariably produces the same effect—is eternal in duration and universal in sway? May it not have had a beginning,—this existing economy? May it not have an end? The combination of secondary causes, which, to appearance, keeps the world in continued being,—may it not have had an origin? May it not have an end? Prof. Tyndall claims that he "can clearly show that the present state of things may be derivative."

He might have said, Must have had an origin *ab extra*. "Modern scientific research tends towards the establishment of this opinion. It enables us distinctly to say that the present order of things has not been evolved through infinite past time by the agency of laws now at work, but must have had a distinctive beginning, a state beyond which we are totally unable to penetrate—a state which must have been produced by other than the now acting causes."*

This orderly succession of events, which must have had a beginning, must have had that beginning in the designs of an Unalterable Will. Change implies changelessness. Succession implies volition. Order implies intelligence. The finite implies the infinite. A law of

* Prof. P. G. Tait, M. A., *Nature*, vol. iv. p. 271.

uniformity implies a Lawgiver who enacted the law, who maintains its integrity, who may hold it in check by a higher law if He chooses, and who may repeal it when through it He has accomplished His predetermined purposes. "The law of design is the highest generalization of the great uniformities of nature."*

Is it then impossible for the scientist and the theologian to join hands? The latter believes that "the things which are seen are temporal; the things which are not seen are eternal." Forth from eternity, by the fiat of the First Cause, came matter, a material world, plant-life, animal-life, sentient beings, and the order in which these manifest themselves. The physicist believes substantially the same doctrine. He admits, and even repeatedly asserts, that the earth, in its present form, must have begun to be; and consequently the present arrangement, so far as the earth forms a part of it—and for us it is the most important part—must have had a beginning, as also all the laws that prevail now and here. There was a time, it is believed, when the earth was an indistinguishable part of a nebula which stretched to the outermost limits of the present solar system. Subsequently, it became a self-luminous globe, a heaving ocean of melted matter enveloped in vapors and gases. Losing heat by radiation, it became a mass of igneous rock, around which circled the waves of a shoreless sea of agitated waters. As the process of cooling advanced, the consequent shrinkage produced ocean-beds, into which the waters were gathered, causing the dry land to appear. The deep was tenantless and the land verdureless. Sir Wm. Thomson, basing his argument on seemingly established data, concludes that the consolidation of the earth's crust could not have begun earlier than ninety-eight million years ago. Then the

* *Mind and Brain*, vol. i. p. 107.

present terrestrial economy, so far as plant-life and animal organisms are concerned, must have had a beginning. Accordingly, Adolph Fiche says, "We are coming to this alternative: either in our highest, most general, most fundamental abstraction, some point has been overlooked, or the universe will have an *end*, and must have had a *beginning*; it could not have existed from eternity, but must at some date, not infinitely distant, have arisen from something not forming a part of the natural chain of causes, that is, *It must have been created.*"

V. THE PRESENT ECONOMY WILL HAVE AN END.

This the Bible student firmly believes. "The things which are seen are temporal"—they had a beginning and they will have an end. "There shall be time no more." "Earth and the things which are therein shall pass away as a scroll when it is rolled together." "The heavens shall pass away with a great noise, and the elements shall melt with fervent heat, the earth also and the works that are therein shall be burned up."—Heb. xii. 27; Isa. xxxiv. 4; Rev. x. 6, vi. 14; II Pet. iii. 10.

Does modern science conflict with these statements? It teaches that worlds, suns, and systems, like animate organisms, pass successively through the stages of birth, adolescence, maturity, decrepitude, and decay. Worlds may now be in process of formation. The earth is probably now in its full maturity. The moon is seemingly an extinct world.

In weighing arguments which bear upon the question of the continuance of the present order of things, it is well to keep in memory the fact that the theory of the dissipation of energy is now considered well established. (Energy is defined as the power of doing work, or as that kind of force which produces change.) Modern science accepts the doctrine of the correlation and conservation of

the physical forces,—light, heat, electricity, magnetism, and chemical affinity. Each force, it is believed, may assume either of these several forms. Force, however, can be neither augmented, nor diminished; neither created nor annihilated. Consequently, the force in the solar system, aside from what it may receive from without, or may lose in interstellar space, is a constant quantity, though it may be incessantly undergoing degradation, thereby passing into a form no longer available for work. That such degradation is going on is conceded by scientists. Though there is such a law as the transformation of forces,—each being capable of conversion,—force cannot be exactly re-transformed, because a portion is converted into heat, a part of which is dissipated. This diffused heat represents wasted energy, being incapable of further conversion. As the force in the universe is constantly undergoing conversion into radiant heat, that is, into an unavailable form of energy, the time must come, however remote, when the present economy will terminate. Such is the opinion of Prof. Helmholtz.

He affirms:—

“ Nature as a whole possesses a store of force which cannot in any way be either increased or diminished. The quantity of force in nature is just as eternal and unalterable as the quantity of matter. . . . From the fact that no portion of force can be absolutely lost, it does not follow that a portion may not be inapplicable to human purposes. . . . If all the bodies in nature had the same temperature it would be impossible to convert any portion of their heat into mechanical work. . . . We can divide the whole force-store of the universe into two parts, one of which is heat and must continue to be such; the other . . . is capable of the most varied changes of form, and constitutes the whole wealth of change which takes place in nature. . . . At each motion of a terrestrial body a portion of mechanical force passes by friction or collision into heat, of which only a part can be converted back again into mechanical force. . . . From this it follows that the first portion of the store of force, the unchangeable heat, is augmented by every natural process, while the second portion, mechanical, electrical, and chemical force, must be diminished; so that if the universe be delivered over to the undisturbed action of its physical

processes, all force will finally pass into the form of heat and all heat come to a state of equilibrium. Then all possibility of a further change would be at an end, and the complete cessation of all natural processes must set in. The life of men, animals, and plants, could not of course continue if the sun had lost its high temperature, and with it its light,—if all the components of the earth's surface had closed those combinations which their affinities demand. In short, the universe from that time forward would be condemned to a state of eternal rest.”

“ Thus the inexorable laws of mechanics indicate that the store of force in our planetary system, which can only suffer loss and not gain, must be finally exhausted.” *

Sir Wm. Thomson asserts:—

“ A material system can never be brought through any returning cycle of motions without spending more work against the mutual forces of its parts than it gained from these parts, because no relative motion can take place without meeting with frictional or other forms of resistance.” Again: “ There can be but one ultimate result for such a system as that of the sun and planets, if continuing long enough under existing laws, and not disturbed by meeting with other moving masses in space. That result is the falling together of all into one mass, which, although rotating for a time, must in the end come to rest relatively to the surrounding medium.” †

Mr. Herbert Spencer asserts:—

“ The tacit assumption hitherto current, that the sun can continue to give off an undiminished amount of light and heat through all future time, is fast being abandoned.”

“ Infinitely remote as may be the state when all the motions of masses shall be transformed into molecular motion, and all the molecular motion equilibrated; yet such a state of complete integration and complete equilibration is that towards which the changes now going on throughout the solar system inevitably tend.”

“ If the solar system is slowly dissipating its forces—if the sun is losing its heat at a rate which will tell in millions of years—if with diminution of the sun's radiations there must go on a diminution in the activity of geologic and meteorologic processes as well as in the quantity of vegetal and animal existence—if man and society are similarly dependent on this supply of force that is gradually coming to an end; are we not manifestly progressing towards omnipresent death? That such a state must be the outcome of the processes everywhere going on, seems beyond doubt. Whether any ulterior processes may

* *Correlation and Conservation of Forces*, pp. 227, 228, 229, 245.

† *Natural Philosophy*, vol. i. pp. 190, 191, 194.

reverse these changes, and initiate a new life, is a question to be considered hereafter. For the present it must suffice that the proximate end of all the transformations we have traced, is a state of quiescence.” *

Scientists are inclined to concede that the moon, which has passed through a protracted series of changes, is destined to ultimate extinction. For some cause, most probably the resistance it meets from the ether, the centrifugal force is gradually diminishing, and consequently the centripetal force is shortening the orbit. Hence, if this state of things continues, the period must arrive when it will fall upon the earth.

Prof. J. R. Mayer says:—

“The movement of celestial bodies in an absolute vacuum would be as uniform as those of a mathematical pendulum, whereas a resisting medium pervading all space would cause the planets to move in shorter and shorter orbits, and at last to fall into the sun.” †

Astronomers also assure us that the earth, which geologists acknowledge has passed through innumerable changes, is destined to still further permutations. It has passed through vast geological epochs; through great ice-ages; through inter-glacial periods, when a tropical climate prevailed, and coral and chambered shells were deposited, and coal beds were formed; through a period of submergence, when sand and gravel were deposited above the coal; through another glacial period, when masses of ice floating on an arctic sea conveyed boulders from distant mountain summits.

Nor are we left without shrewd conjectures as to the causes which produced these climatic changes. Some regard them as due to changes in the inclination of the earth’s axis to the plane of its orbit. Some imagine that the solar system, in its journeyings through space, passes

* *First Principles*, pp. 493, 495, 514.

† *Correlation and Conservation of Forces*, p. 269.

through regions of different temperature. Some attribute the differences to changes in the distribution of land and water. Some seek a solution of the difficult problem by assuming a change in the position of the earth's axis, caused, perhaps, by lofty mountains between the poles and the equator. Some argue that the succession of glacial and tropical periods is the result of a variation in the amount of heat received from the sun, which is pronounced a variable star. Some maintain that these wide differences of temperature are due to a change in the elipticity of the earth's orbit, which, when nearest circular, produces a tropical period, when most eliptical, causes an ice-age. Some—conspicuously Mr. James Croll, in his work, *Climate and Time in their Geological Relations*—find a solution of the bewildering problem in the united influence of a precession of the equinoxes and a change in the obliquity of the ecliptic. These causes, it is said, have produced three great ice-ages in the last three million years, separated by irregular intervals, and lasting, respectively, one hundred and fifty thousand, two hundred and sixty thousand, and one hundred and seventy thousand years. The last period, it is conjectured began two hundred and forty thousand years ago, and terminated seventy thousand years ago; for the last ten thousand years we have been approaching a tropical period, which will reach its maximum in about twenty-four thousand years.

Whatever opinions one may be disposed to entertain in reference to these and similar abstruse calculations, he can scarcely fail to concede that the surfaces of the continents have undergone great changes. Under the action of frost and rain, the rocks of the loftiest mountains are gradually transported to ocean-beds. Indeed, these influences are so potent that but little difficulty is

experienced in accepting the assertion that ocean and continent have exchanged position at least once, and probably several times.

That the earth, which has been the theatre of many and great changes, is destined to further change, and to ultimate extinction, can scarcely be denied. Like the moon, it encounters resistance in its journeyings through space, and must consequently be moving in a shorter orbit, and must at last fall into the sun. Prof. J. R. Mayer asserts that, assuming a resisting medium * (which astronomers are unanimous in doing), all the masses of matter within the limits of the solar system must some day find a grave in the sun. The moon's mass would keep the sun's fires burning from one to two years; the earth's mass, from sixty to one hundred and twenty years.

Another evidence that the earth, which had a beginning, must have an end,—at least as a habitation for such organisms as now exist upon it,—is found in the fact that it is ceaselessly parting with its interior heat by radiation. It was once a liquid mass, as is proved by its form, being flattened at the poles. The liquid condition was not that of water, but of dense matter melted by a high temperature. The earth must have been a molten sea. The increase of temperature discoverable in boring artesian wells, and the numerous thermal springs and volcanic eruptions, prove that a high temperature still prevails in the interior of the earth. Experiment has shown that the earth's crust increases in temperature at the rate of one degree for thirty meters of descent towards its center. Consequently, at the depth of a few miles, every known substance would be fused—leaving a heaving mass of melted matter encased in a hardened crust. The interior heat

* That interstellar spaces are filled with a luminiferous ether is the opinion of all eminent scientists, including J. Clerk Maxwell, Helmholtz, Faraday, etc.

of the earth is generally regarded as a result of the mechanical union of two or more cosmical masses which are supposed to have entered into its original composition, or as a result of the condensation of matter which once pervaded the space of the solar system between its nearest neighboring systems. During its incandescent state, it must have parted with heat much more rapidly than it does at present, or has done for many ages. The cooling process must have gradually become less and less pronounced, the hardened crust continuously diminishing the amount of heat lost by radiation. During this protracted period, the convulsions of its surface must have been great and widely extended. Mountain-chains, the back-bones of continents, must have been formed by upheavals, or by the shrinkage which caused ocean-beds, or by these two causes acting in conjunction.

It is estimated that the amount of heat now lost by the earth in the space of a hundred years is equal to the amount needed to melt a layer of ice three miles in thickness and covering the entire surface of the globe.

This immense loss must result in the gradual contraction of the earth's crust, which contraction is going on, as is evidenced by earthquakes and volcanic eruptions. Notwithstanding this decrease in the length of the earth's radius, the day has remained the same length for at least two thousand years. This seeming anomaly is regarded as sufficiently accounted for by assuming that the tidal wave has tended to diminish the velocity of the earth's rotation, to the exact extent that the shortening of the radius has tended to its increase; that, consequently, during the present era the length of the day has remained unchanged. In the earlier existence of the earth, however, the great rapidity of the cooling process may have caused, probably did cause, a continual increase in the

velocity of rotation, the day growing shorter and shorter until it reached its present uniform length. It is also assumed that the time may come, when the retarding influence of the tidal wave may cause a sufficient decrease in the velocity of rotation to produce a sensible elongation of the day. The earth, which is now in its full maturity, is regarded as having had its youth, and as destined to pass into the decrepitude of old age.

This continued cooling of the earth's crust must of course have a sensible effect on temperature, and may ultimately render it uninhabitable, causing all organic life to perish, leaving the planet one vast sepulchre. Certainly this loss of heat cannot continue forever without terminating the present economy. The earth, in this respect at least, does not present evidence that it is destined to continue in its present state throughout unending ages; indeed, it evidently cannot.

Nor is it less certain that the sun, the center of energy to the solar system, is undergoing a rapid succession of changes which apparently must result, sooner or later, in the death of the planetary system. The temperature of every luminous body necessarily decreases in proportion as it radiates heat; and unless the loss it thereby sustains is made good from some source, it must of necessity become cold and lightless. Every candle, however lengthy, ultimately goes out in darkness. Every fire, however vast the amount of fuel thrown thereon, unless the amount is infinite, must die out for want of material to be consumed. The sun is a fire; and accordingly must be extinguished some day, unless its storehouse of fuel is absolutely inexhaustible. The heat it radiates each minute is so vast in amount—12,600,000,000 cubic miles of heat—that if it were a solid globe of anthracite coal it would burn to ashes in about sixty-four centuries.

Consequently, unless its fires are kept up by the addition of new fuel, the solar system must ultimately be shrouded in darkness and bound in the fetters of death. If it receives fuel from without it must receive it, apparently, from the space circumscribed by the orbit of the most remote planet of the system. This entire space is filled, it is true, with a vast number of ponderable objects, asteroids or shooting stars. These, having a tendency to move towards the center of gravity, finally fall into the sun, finding a grave, and aiding to continue the pulsations of life in the remainder of the system; indeed all cosmical masses—the number of which must be almost infinite—circle around the sun in an ever diminishing orbit with a velocity determined by their size. Consequently, all are destined, sooner or later, to extinction in the sun, into which an uninterrupted stream of fuel is incessantly pouring. Its fires are thus kept burning with undiminished intensity, satellites, comets, and cosmical atoms, or asteroids as they have been called, furnishing fuel.

Numerous, however, as these cosmical masses are—thousands of millions of shooting stars most probably coming near the earth in a single year—the time must come when the last will have found a sepulchre in the sun; nay, the time must come when asteroids, comets, and satellites being exhausted, the planets themselves, which are revolving around the sun in ever diminishing orbits, must fall into the same grave. Such, at least, is the opinion of Sir William Thomson: "As the weights of a clock run down to the lowest position, from which they can never rise again unless fresh energy is communicated to them from some source not yet exhausted, so surely must every planet creep in, age after age, toward the sun."

Some one, perhaps, may be disposed to say: Possibly the sun, if a vast fire, obtains its fuel from beyond the limits of the solar system, or from the trackless fields of space through which it moves accompanied by its system of worlds. But evidently, it could not obtain its fuel from beyond the limits of its own attractive power; and such limits must exist, for it is not the center of gravity of the universe. Consequently, if not confined strictly to the space enclosed within the orbit of its most remote planet for its supply of fuel, it must at least be confined to the circle of its own attractive energy, that is, it has not an infinite store-house from which to draw. Nor could it obtain an infinite supply from the fields of space through which it journeys, for its pathway, in conformity with law, must return into itself, and consequently is not infinite. It cannot obtain an infinite supply from a limited portion of space, which is all that can come under the range of its attraction. An infinite number of cosmical masses would not only render this limited space a plenum, but would render infinite space a pleium. Consequently, neither from beyond the limits of the system, nor from the fields of space through which the system passes, could the sun obtain an infinite supply of fuel; but an infinite supply is needed if the sun's fires are to keep burning forever.

It may, perhaps, be said that some eminent astronomers do not accept this fuel-hypothesis in reference to the sun's heat. This is true, but the counter theories are either less tenable, or are such as concede that the solar system is dissipative, not conservative. If it is dissipative, it cannot be everlasting. If it is conservative, it is an example of perpetual motion, work done without any loss of energy. If the generation and the diffusion of energy are results of the rotation of the sun upon its axis,

then it is necessary to assume, contrary to experience, that mere motion, independent of friction, can produce heat, or that the sun meets with sufficient friction from the enveloping ether to generate the heat it possesses. But simple motion, it is conceded, cannot produce heat. Nor can the sun's heat be produced by friction with ether, for a point on the sun's equator travels only about four times as rapidly as a point on the earth's equator, and only about one-sixth as rapidly as a point on the equator of Jupiter;—still, no heat is generated by the rotation of Jupiter upon its axis. It is not a sun but a planet.

Some assume that the fall of cosmical masses into the sun produces heat by mere percussion. If this be true, the fuel-theory is indeed disproved; but it does not follow that the sun can continue to generate heat forever. The heat produced by percussion must be exhausted when the last mass has fallen into the sun. The present discussion, consequently, does not require the refutation of this theory.

It has been supposed that possibly solar heat is the energy of gravitation transformed by condensation of the sun's mass; and that this molecular motion is transmuted into radiant heat and sent outward through space in every direction. It is safe to affirm that condensation of the sun's mass could not possibly continue forever. On this theory also the system is not conservative, and consequently must terminate.

It is argued by others that the sun's rays, which are assumed to be cold, simply cause a "substance," heat, to pass from a state of rest to a state of motion. This assumes that the sun is not a heated body, though it can generate heat; that "cold" is not a relative term; that heat is a substance, not a mode of motion, and a

substance now cold, now hot, now at rest, now in motion. Such notions are regarded in the present day as eminently preposterous. Besides, it is an undeniable fact that the sun radiates not cold light, but heated rays.

The only remaining hypothesis meriting attention is that which assumes that the sun is continually receiving from the system as much heat as it diffuses, the system being consequently a mechanism capable of running on forever without any waste whatever, an example of perpetual motion, a conservative system, not a dissipative. Without entering upon the discussion of this question we content ourselves with reminding the reader that the most eminent scientists, Sir John Herschel, Balfour Stewart, Prof. J. C. Maxwell, Sir William Thomson, Prof. Helmholtz, Prof. Tyndall, and others, agree in regarding the planetary system as dissipative, not conservative. It is not supposed that the system has any such efficiency as to be capable of pursuing a fixed course of self-development extending throughout endless duration, independent of any external influence; nor is it imagined that force, communicated to matter at its creation, is equal to the task of keeping the machinery running forever, no additional force and no control of existing forces being necessary. An inexhaustible supply of energy from mechanical processes, or from natural forces, be they thermal, electric, or chemical, is an impossibility. The effort to ascertain the origin of force leads directly into the presence-chamber of the Infinite Personality who sustains all existences; upon whose unconditioned will the continuance of the present order of things must depend.

This introduces to a consideration of one further proposition:—

VI. THE CONTINUED EXISTENCE OF THE UNIVERSE IS DUE TO THE WILL OF GOD.

That the universe finds its causality in God has been proved. Matter, force, life, spirit, owe their existence to His efficiency. In this opinion there is general concurrence, though theists differ when they come to answer the questions, Are these existences simply effects of Divine volition, being called into being *ex nihilo*? or are they a formation from God's own self-existent substance?

Having been led to believe that the fundamental relation of God to the universe is that of Originator, it is proper to inquire whether He is not also its Sustainer. Did His connection with the existing order of things terminate immediately after He inaugurated it, or does He still sustain it in being? Now that the complicated machine is in operation, does it possess real efficiency? or is it to be understood that God is immanent in nature, continuing matter in being, giving potency to physical forces, and sustaining all forms of life,—plant-life, animal organisms, and spiritual existences? Is man to believe that God, after creating a universe, left it to tell off its fated periods uninfluenced by His will? or is He to be regarded as the Conservator of all things, as well as the Creator? In scientific discussion this is the fundamental question: What sustains the universe in being? By the answers given, reasoners are classed as atheists, deists, pantheists, or theists.

Satisfactory evidence having been furnished that the present order of things must have had a beginning in the unconditioned will of God, and will have an end, it would be legitimate to limit the discussion to a consideration of those theories of conservation which find acceptance with believers in the existence of God.

Nevertheless, it may be well to enumerate the four principal theories:—

1. Matter, of which force is but a phenomenon, is the Conservator of the universe.
2. Force, of which matter is but a phenomenon, is the Conservator of the universe.
3. An underlying reality, an infinite life, of which matter and force are equally phenomena, is the Conservator of the universe.
4. A Personal God, who created matter and whose will is the only self-existent force, is the Conservator of the universe.

The first theory is that entertained by thorough-going materialism. The pure materialist affirms: Matter is all I need; with its atoms I can explain the universe. Matter is eternal. I am perplexed by no questions in reference to the origin of things. Atoms are indestructible, and force is one of their essential attributes; consequently, the indestructibility of matter and the persistence of force sustain all things in being—no other conservation is needed.

Of the two existences, matter and force, each of which has been so long struggling in scientific discussion for the honor of being the Ultimate of all ultimates, he persists in regarding the former as the only reality. Even mind he regards as an attribute of matter; and so regards plants and animal-life. "The atomists," says Lange, "attributed to matter only the simplest of the various properties of things—those, namely, which are indispensable for the presentation of a something in space and time; and their aim was to evolve from these alone the whole assemblage of phenomena. They it was who gave us the first perfectly clear notion of what we are to understand by matter as the basis of all phenomena."

As to appearance there are activities everywhere—gravitation operating through interstellar space,—the materialistic theory, to be logical, ought to carry with it a belief in the continuity of matter.

If the universe is a material plenum, how is it possible for matter to be expanded by heat or contracted by cold? An iron rod, when heated, is not expanded by the generation of new iron, and if it were, how could it expand in a plenum? If it is said: Being more dense than the enveloping atmosphere, it compresses the surrounding air; the reply is: Then the space surrounding it was not full. Particles in actual contact can be brought no nearer together. The most subtle fluid, if continuous, occupies all space. If matter is not continuous, then there are spaces where there is no force in operation, or force may be dissevered from matter. But if the universe is a material plenum, reason would seem to affirm: then there can be no difference in the density of its several parts; but if there is a difference in density, how can heat—which is a mode of motion, and not a substance—cause expansion, and that too without creating a void? If it is said that a subtle fluid, in the interstices of the iron, is expanded, then some fluid more subtle must occupy the interstices in the first fluid, and a fluid more subtle still must occupy the interstices in the second fluid, and so on *ad infinitum*. Accordingly, there must be a difference in the size of the ultimate particles of matter,—the fine, the finer, the finest; indeed, there must be an infinite gradation in the minuteness of atoms. Besides, particles imply division, and division implies discontinuity. Again, in a plenum the only motion possible, apparently, is a vortical motion. But this reduces matter to a mere abstraction: it is no longer a material entity. Insurmountable difficulties environ us, if we attempt to regard

matter as continuous, and by consequence as a satisfactory explanation of the universe.

Accordingly, as James Martineau affirms, many advocates of materialism prefer to believe that "the universe consists of atoms and empty space." They regard matter as discontinuous. But materialism asserts, as there is no matter without force, so likewise there is no force without matter; an assertion which apparently should be understood as affirming that force cannot exist in empty space, millions upon millions of miles from any heavenly body; for if there is any empty space, the interstellar regions should be regarded as such. It is difficult, to say the least, to believe that matter can produce effects across an almost limitless void. Science regards this conception as so exceedingly difficult, that it accepts the theory of an all-pervading luminiferous ether.

But this hypothesis does not aid the materialist in the slightest degree; for if it is impossible to conceive that the sun's attractive force can be exerted upon the earth through an intervening void, it is equally impossible to suppose that the attractive force resident in an atom of ether can be communicated to the nearest ether-atom through a vacuum, the void between the two atoms of ether, if the ether is discontinuous, being no doubt as great—if not greater—in proportion to the size of the atoms, as is the distance from the earth to the sun in proportion to their masses.

If atoms can exert an effect through a vacuum, let us suppose two atoms sufficiently remote from each other to remain relatively at rest. This supposition will answer the purpose, since there can be no essential difference in the case, whatever may be the extent of the interval between the atoms. Is it supposable that each of these two atoms attracts the other through a void, two forces being

communicated without any medium of communication? Force has then, apparently, an actual existence dissevered from matter, though the materialist asserts there can be no force without matter. Whether there can be or not, the materialist is compelled to concede that matter is either not discontinuous or it can act where it is not. If only these two forces of attraction were in operation through this intervening vacuum, the two atoms must be brought into actual contact. They are not: two repelling forces are in operation. Consequently, at some imaginary point between the two atoms, attraction must be in deadly struggle with repulsion. Forces, which are not matter, meet in a vacuum and neutralize each other, and yet they have no independent existence. Nay, forces operating through almost interminable intervals, though mere attributes of far-distant matter, discover each other and destroy each other in their deadly encounter. It is difficult to believe that force is a mere attribute of matter, and neither has, nor can have, an independent existence. As long as it remains so difficult to conceive that force, if a mere phenomenon of matter, could act in a vacuum, it will be difficult for materialists to convince the world that spirit is an attribute of discontinuous matter. If force can operate where no matter is, why may it not be an independent entity? And if force may possibly have an existence independent of matter, why may not spirit? And if the human spirit may be active without dependence on molecular vibrations, may we not believe in the existence of an extra-mundane God? If God exists, it is more reasonable to regard Him as the Conservator of the universe than to regard discontinuous atoms as the sustaining power of the universe.

The second theory regards force as the Conservator of the universe and matter as merely phenomenal. The

properties of matter, it is asserted, are effects of an underlying reality. If matter is simply local force, which in the ultimate analysis merges into dynamic points, centers of attraction and repulsion; then mathematical points attract and repel each other. Can there be attraction with nothing to attract? Can there be repulsion with nothing to repel? After resolving solidity into force, and extension into a mathematical point, nothing remains except position. Consequently, even the possibility of motion is eliminated. How can there be motion with nothing to be moved? It is manifest that matter is indisposed to submit quietly to this process of elimination. It refuses to be politely bowed out of existence.

This theory, that matter is a phenomenon of force, leads naturally to some form of idealism; though not necessarily to the form commonly attributed to Berkeley, who possibly has been misunderstood. To know that anything exists outside of one's self he regarded as impossible. Perhaps he did not consider the external world a dream, but was discussing the philosophical question: What is the underlying reality? Color, smoothness, hardness, all the properties of matter, he resolved into perceptions. Accepting the unity of the universe as an established fact, and being unable to satisfy himself that matter, in the ultimate analysis, was anything more than a phenomenon, he was in search of the underlying substance, in which what is known as the material, and what is known as the dynamic, may inhere. Matter and mind are both existences. Which is the real substance? He answered: Not both, but mind. He persisted in viewing matter as something not essentially different from mind; as in fact the creation of mind, an aspect of the one eternal substance. The present discussion does not call for a refutation of idealism.

Those who accept the dynamic theory as a satisfactory explanation of the origin of matter, of life, and even of consciousness, are under the necessity of regarding force as the conservator of all things. A moment's reflection, however, will suffice to discern some serious difficulties in the way of considering this the world's conservator. The forces of nature, as far as known, are capable of transmutation. How can these transmutable forces arrange themselves into an order in time and in space? Their order is a phenomenon which implies an intelligent power back of them; it is evidently not a function of the forces themselves. They run back to one force, which, if it is to maintain the present order of things, and is to evolve in an orderly succession another state of things, must be something more than blind energy groping for agencies by which to preserve the existing economy, or ignorantly searching for channels through which to introduce a series of changes, each of which is a graduated step in a fore-determined plan. Plurality of forces thus disappears; but the one force which remains refuses to do the work imposed upon it without being invested with the attributes of God. It is an intelligent force, indeed must be. Continuance without causality is just as inconceivable as is origination without causality.

There cannot be an existing order of things without the possibility of a different order. If the existing order persists in continuing, there must be some adequate cause to effect the continuance; and that cause cannot be resident in the order itself. It cannot be the forces of nature, for science pronounces these simply phenomenal manifestations of *one force*. It cannot be this one force regarded as mere physical energy, nor indeed as energy of any kind, for its manifestations maintain an order in time, in space, and in potency, and even evince a purpose.

If, then, force is to be regarded as the conservator of the universe, it must be considered as the exact equivalent of power, that is, as will. In short, it must be exalted to the throne of universal dominion, and may as well bear the name God, as to be recognized under a new designation. To the final cause, the theist irresistibly attributes personality. Nor is he driven from this by being charged with anthropomorphism. Though he may be told by some that force has no real existence, and by others that matter has none, he is indisposed to believe that will is merely phenomenal. He believes himself capable of exercising will-power. Consequently, in his judgment, the existence of a universal will has a more satisfactory basis upon which to rest than the reality of either matter or physical force; for the difficulty in regarding the human will as a mere phenomenon has prompted most reasoners to pronounce it an independent reality. Consequently, if the universe continues as a result of mechanical or dynamic necessity, this, far from proving the absence of purpose, proves persistence of purpose on the part of an eternal will. Than will, no other cause is known to exist. Some cause must produce this continuance. The cause is not in nature herself, for nature has no will. Therefore, the cause must be supernatural, an unconditioned will. Absolute causation in nature is a thing which science has not yet proved. Is the human intellect capable of proving that the present order is not the result of will? May not an omniscient mind have so constructed the cosmos as to make it contain within itself the evidence of an inherent necessity? Everything runs backwards irresistibly to Unconditioned Personality. Origination and conservation alike find their explanation in free causality.

Mr. Herbert Spencer asserts:—

"Matter and motion are both regarded by me as modes of manifestation of force, and force, as we are conscious of it when by our own efforts we produce changes, is the correlative of that universal power which transcends consciousness." "The existence of this inscrutable power is the most certain of all truths." *

The third theory regards matter and spirit as equally phenomena of an underlying reality. This is the pantheistic explanation of the conservation of the world. It assumes that neither force nor matter furnishes an explanation of the origin of things or of their persistence in continuance. In common with theism, it maintains that nature is not explicable on mechanical principles. It asserts that back of both matter and force is a fundamental mystery which mechanism cannot explain, and which therefore may not be considered mechanical. This underlying reality is an infinite life. Consciousness is back of physical phenomena. Back of consciousness is that from which consciousness springs, self. Even self is a vanishing mirage. Back of self is an infinite ocean of being that rolls itself, wave after wave, into a little cove which I denominate *self*. I am fleeting impressions; but I am more: I am a bundle of memories; but I am more: I am a substratum of conscious susceptibility; but I am more—I am part of the Infinite. The sense of personal identity, which is lost at death, is almost certainly lost forever.

On this theory, God's relation to the world is that of an ever-abiding life, the soul of creation, hylozoism; or that of an unconscious intelligence operative everywhere, pantheism; or that of an Infinite Personality (though infinity and personality appear irreconcilable) underlying nature and not certainly known to have an existence independent of nature.

The fourth theory considers matter and spirit two distinct substances. This is the theistic conception. It

* *First Principles*, pp. 579. 581.

assumes that God, an eternal Spirit, created the universe, and sustains it in being. Origination and conservation are effects of His own unconditioned Will. Matter owes its existence to His volition, its continuance to His sustaining power. It may be an effluence of His own self-existent substance, but is not independent of His will. Force is His immanence in nature. Life is His creation, not necessarily *ex nihilo*, but possibly a drop of His own eternal Personality, assuming the various forms it manifests as a result of His direct volition. Consciousness is His creative work, though it may be but a self-willed efflux from His own Infinite Personality.

This theory denies that the world is a self-adjusting machine, the total *vis viva* of which can be neither increased nor diminished. It repudiates the doctrine that the forces operative in nature are eternal, and that consequently they suffice to sustain the universe. It refuses to concede that active force, communicated to matter at its creation, renders immediate Divine agency unnecessary to the conservation of the world. On the contrary, it maintains that in tracing force back to its origin we come into the presence-chamber of an Unconditioned Will, of the Infinite Personality, who unceasingly exerts sustaining power upon matter, plant-life, animal organisms, and sentient beings. It repudiates hylozoism and every form of pantheism, refusing to identify divine power and divine intelligence with the agencies at work in the world of matter and mind.

As the Divine Immanence in Nature has been previously discussed, nothing more is now demanded than the presentation of selections from Scriptural assertions bearing upon God's present relations to the world. "He is before all things and by Him all things consist" (Col. i. 17). The existing order of things then is not eternal,

but had a beginning in time. There was a period when it was not, though God was. It was not a self-evolution, for "God is before all things." Not even in their substantial existence are all things eternal; much less are they so in the individual forms they assume. Matter, coming into existence subsequently, has indeed assumed new forms. Life, having an origin in the will of God, has become manifest in more complex forms; but no living organism is co-eternal with Him. Everything has had an origin. The passage further affirms that nature does not possess the power of self-preservation. Separate forms of matter,—worlds and systems of worlds,—the various modes of physical force and individual living organisms, do not have continued existence independent of the Divine efficiency. "Of Him, and through Him, and for Him, are all things" (Rom. ii. 36). "He giveth to all life, and breath and all things" (Acts xvii. 25). "He upholds all things by the word of His power" (Heb. i. 3). "There are diversities of operation, but it is the same God who worketh all in all." "In Him we live, move, and have our being."

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